

ROADS AND STREETS

JUNE 1946

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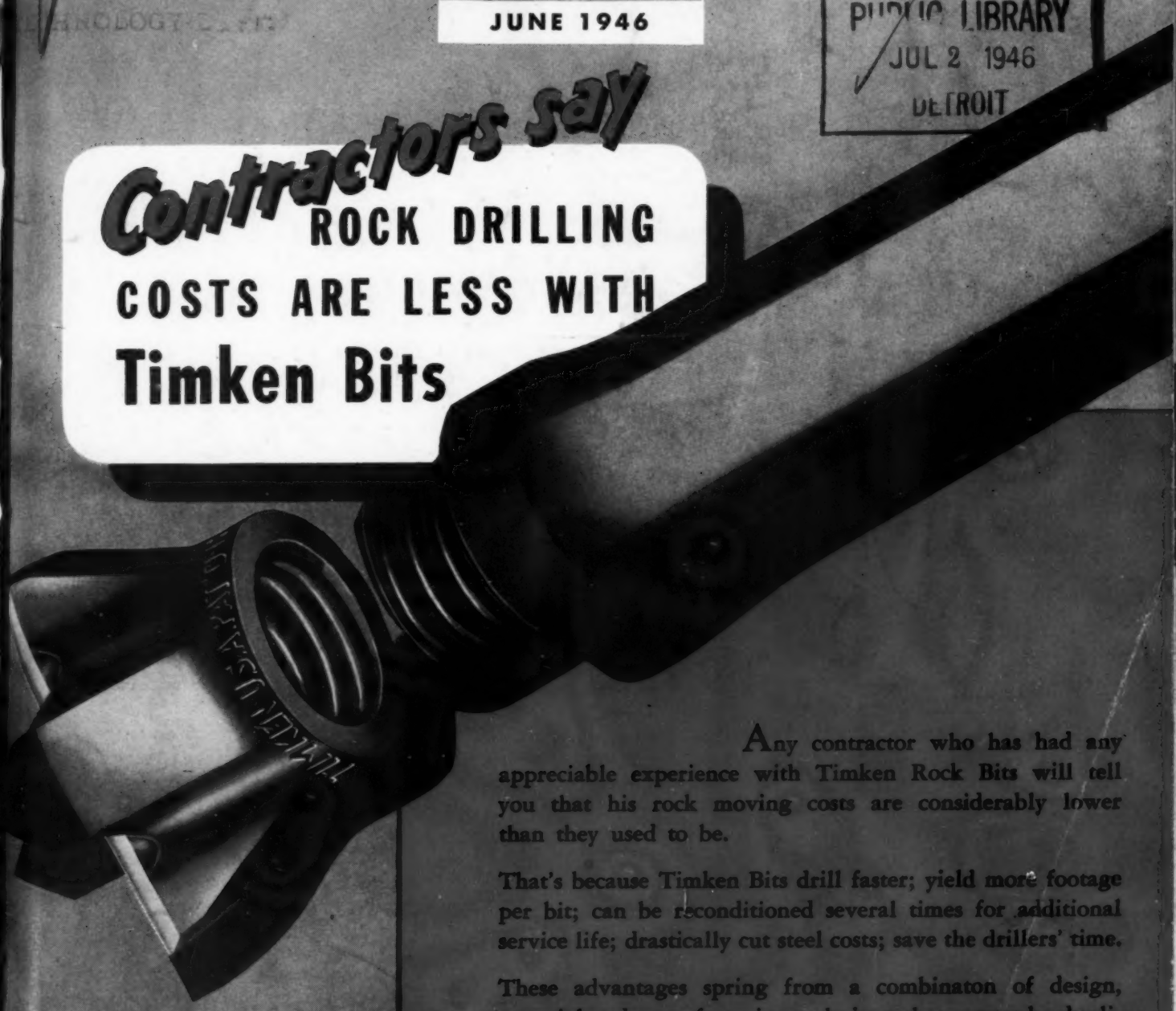
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DETROIT

Contractors say
ROCK DRILLING

COSTS ARE LESS WITH

Timken Bits



Any contractor who has had any appreciable experience with Timken Rock Bits will tell you that his rock moving costs are considerably lower than they used to be.

That's because Timken Bits drill faster; yield more footage per bit; can be reconditioned several times for additional service life; drastically cut steel costs; save the drillers' time.

These advantages spring from a combination of design, material and manufacturing technique that cannot be duplicated. No other bit manufacturer makes his own steel. No other bit manufacturer has the benefit of such far-reaching metallurgical knowledge and experience.

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EVERY TIME WITH ADAMS MOTOR GRADERS

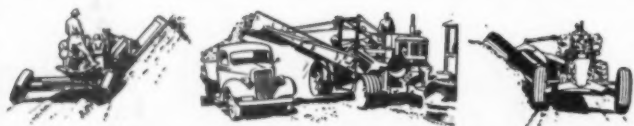
● It is no accident that Adams Motor Graders are predominantly preferred by contractors and city and highway officials. They have learned through long experience that Adams Motor Graders are outstanding in design and performance—*unequaled for smooth, accurate work on roads, streets and airports.*

For example, Adams' *Positive-Acting Mechanical Controls* assure fast, accurate blade and scarifier adjustments; *Built-in Rigidity* eliminates lost motion in controls, holds blade

and scarifier solidly in place; *Balanced Weight Distribution* provides always-ample pressures for forcing blade and scarifier into hard materials; *8 Overlapping Forward Speeds* assure exactly the right speed to do any given operation at the fastest practical rate.

Discover how these and other Adams features will do all grading jobs *better, faster, more economically.* For the complete performance facts, see your near-by Adams dealer.

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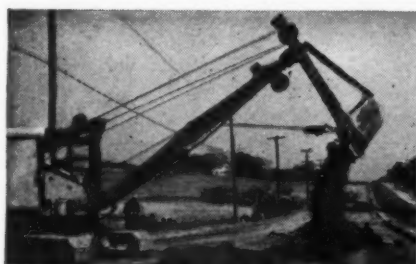
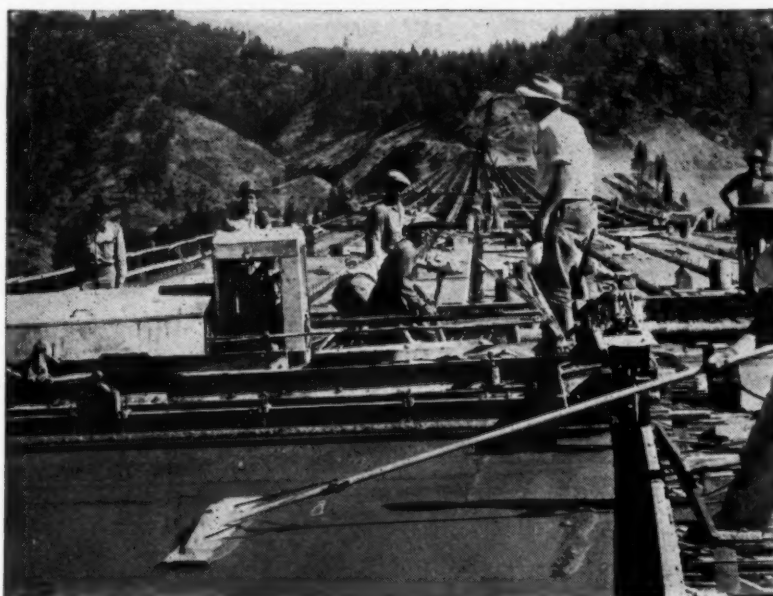
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RUGGED STEELS. for RUGGED JOBS



That's what highway contractors get when they buy from Bethlehem's complete line of road-steel products. Whether it's steel to help in building the highway—or steel that becomes a permanent part of the road or right-of-way—there's a Bethlehem steel product to do the job.

Which is why so many contractors today are turning to Bethlehem Road Steel Service. They know that the products they get will be designed and built for rugged, lasting performance. And, what's just as important these days, they know that they get service that's helpful and reliable.



RUGGED WIRE ROPE

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RUGGED GUARD RAIL

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ROADS AND STREETS

No. 6

JUNE, 1946

Vol. 89

In this Issue

Battling Wet Soil at Dubuque Airport	65
By Harold J. McKeever, Editor, Roads and Streets	
Lake Drained to Build Cut-Off	68
Replacing Old Covered Bridge with Steel Truss ..	70
Second Postwar F. A. Apportionment Made	71
Editorials	72
St. Paul Plans New Civic Plaza	73
Mobility Means Money to Graveling Contractor ...	74
Federal Airport Act Approval Sets Stage for Action	77
Job and Equipment Ideas	78
Relieving Congestion in N. J. by Overpassing Traffic Circle	80
Lumber Shortage a Critical Problem on Bridges ...	83
Elastic Limit Basis for Finding Soil Bearing Power ...	84
By Lt. Col. V. J. Brown, Publishing Director, Roads and Streets (on military leave)	
Drainage Fundamentals Reviewed	88
Construction Inspectors Get Pre-season Briefing ...	95
By D. T. Robinson, Junior Highway Engineer, Connecticut State Highway Department	
Ironing Out Specification Wrinkles	96
By R. A. MacGregor, Executive Secy., Contractors' Association of Western Pennsylvania, Pittsburgh	
Recent Bids	101
Construction Equipment Maintenance:	
How to Get the Most from Electric Tools	104
Postwar Parade of New Equipment and Materials ...	108
Manufacturers' Literature	115
With the Manufacturers and Distributors	121
Clearing House	130

A magazine devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations, and to the construction and maintenance of airports.

WITH ROADS AND STREETS HAVE BEEN COMBINED GOOD ROADS MAGAZINE AND ENGINEERING & CONTRACTING
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At Right: This International TD-18, ➡ grading for a new building, has a loaded uphill job which its power-packed, full-Diesel engine handles easily.

Opposite Page: An International TD-9, with bullgrader and 2-wheel scraper, builds an addition to an airport in a resort community. Fast worker! It averaged a yard per minute on 100-ft. hauls at a cost for fuel of \$1.43 per 9-hour shift.



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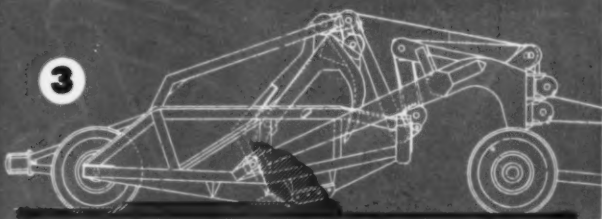
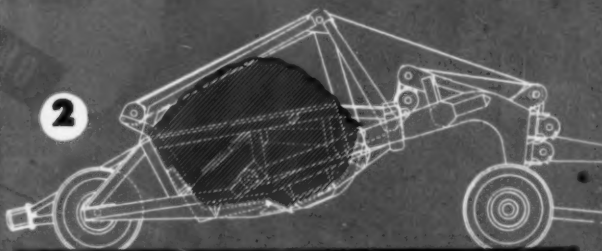
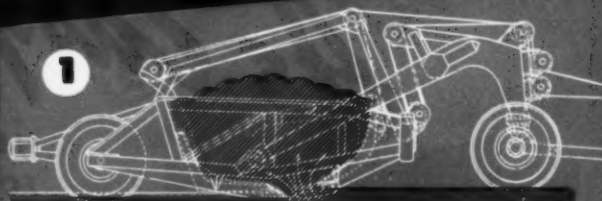
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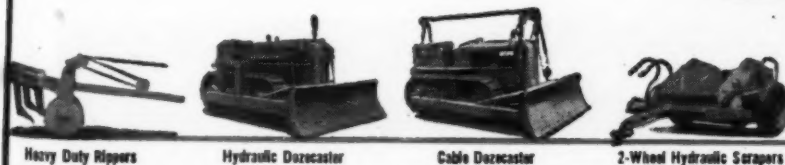
2. **CARRYING:** This position provides extremely high clearance of cutting edge, essential in traveling over uneven ground and in discharging sticky materials. Proper weight distribution with exceptionally low center of gravity assures stability—provides for maximum tire life.

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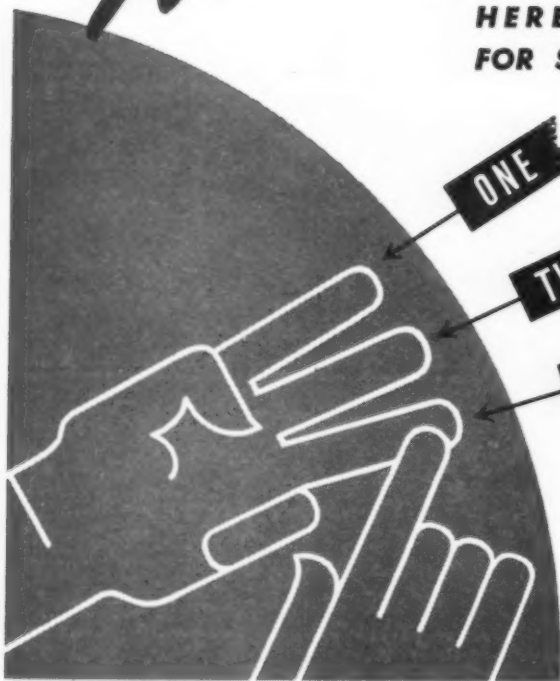
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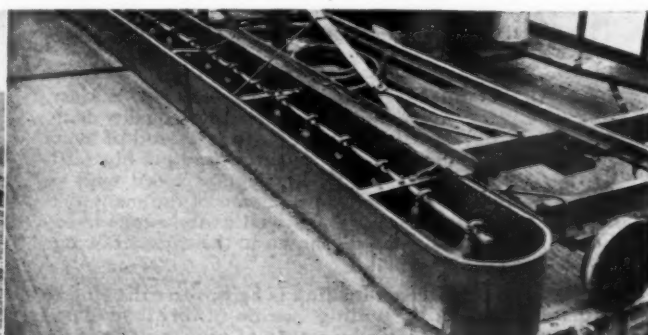
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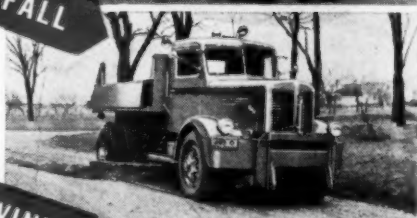
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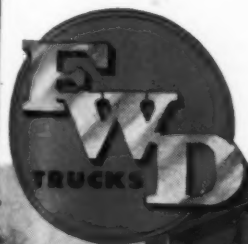
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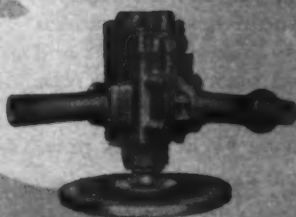
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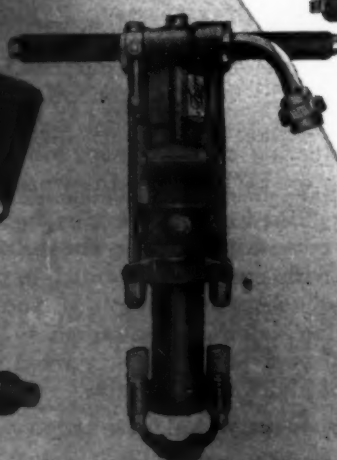
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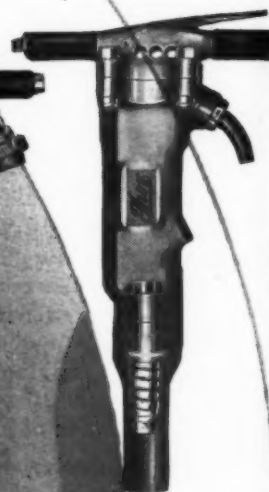
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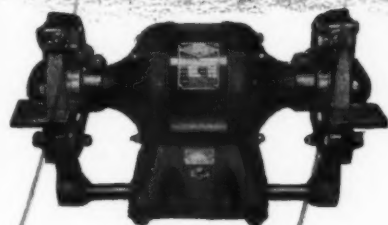
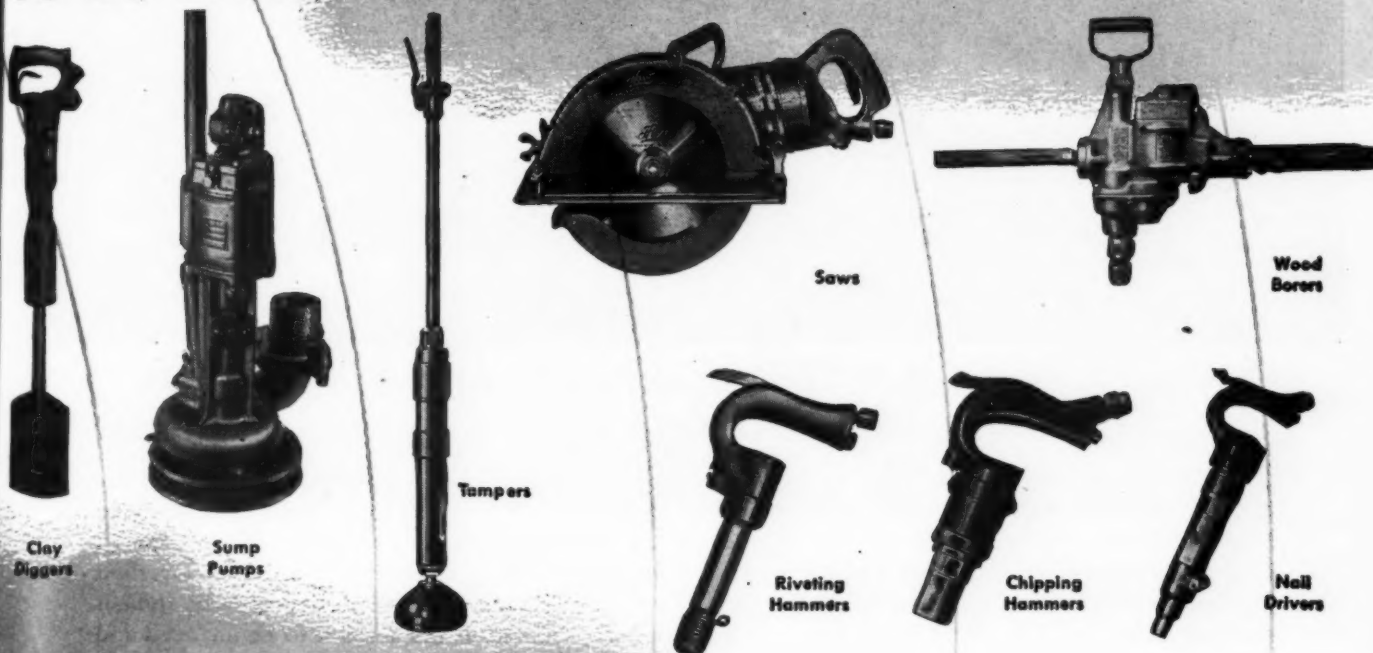
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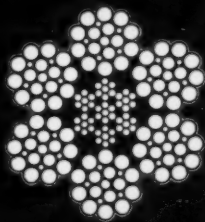
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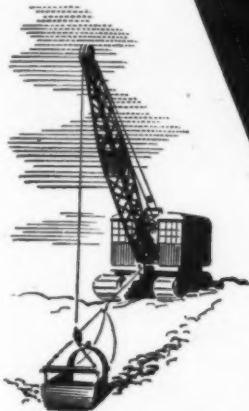
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Specify Upson-Walton 6 x 16 Filler Wire Perfection Layrite wherever you need greater flexibility combined with longer wear!

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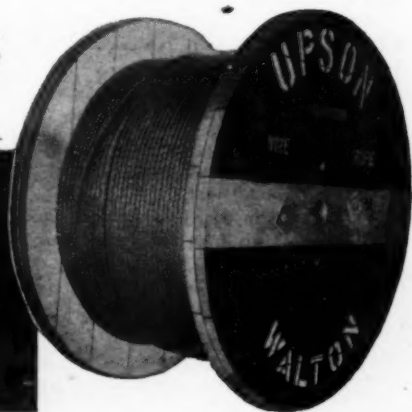
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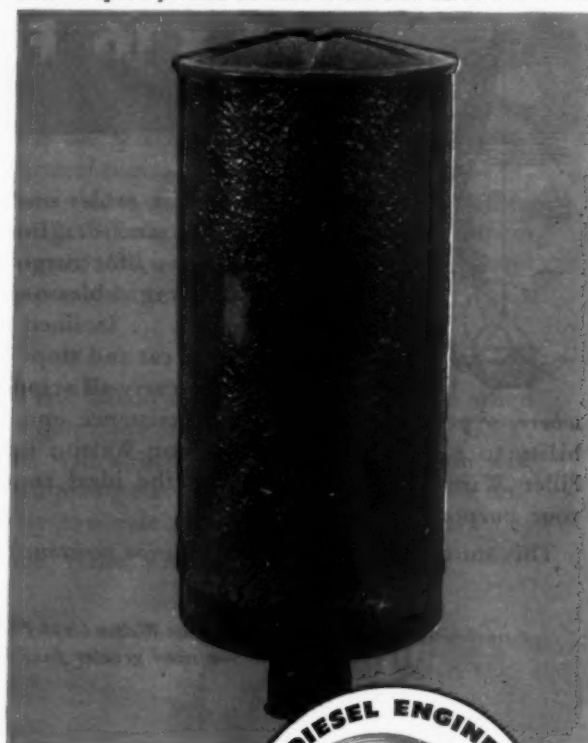
To match the fine performance of RPM DELO OIL, use these equally efficient companion products from the same famous "RPM" line—RPM HEAVY DUTY MOTOR OIL—RPM COMPOUNDED MOTOR OIL—RPM GEAR OILS AND LUBRICANTS—RPM GREASES. For additional information or name of your distributor, write any of the companies below:

STANDARD OF CALIFORNIA • 225 Bush St., San Francisco 20, California
THE CALIFORNIA COMPANY • 17th and Stout Streets, Denver 1, Colorado
STANDARD OIL COMPANY OF TEXAS • El Paso, Texas
THE CALIFORNIA OIL COMPANY • 30 Rockefeller Plaza, New York 20

Clogged Oil Filters Cause Frequent Shutdowns

One cause of frequent costly and time-wasting Diesel shutdowns is filter clogging. The condition can become dangerous since a clogged filter may stop circulation of oil to the engine if the warning of a drop in oil pressure is not heeded. Analysis of filter deposits prove them to be composed of products resulting from incomplete burning of the fuel and oxidation of oil plus iron, silica and water.

Filter Deposit formed in 1230 hours with RPM DELO Oil.



THIS No. 101 UNIT IS PACKED FULL OF UTILITY



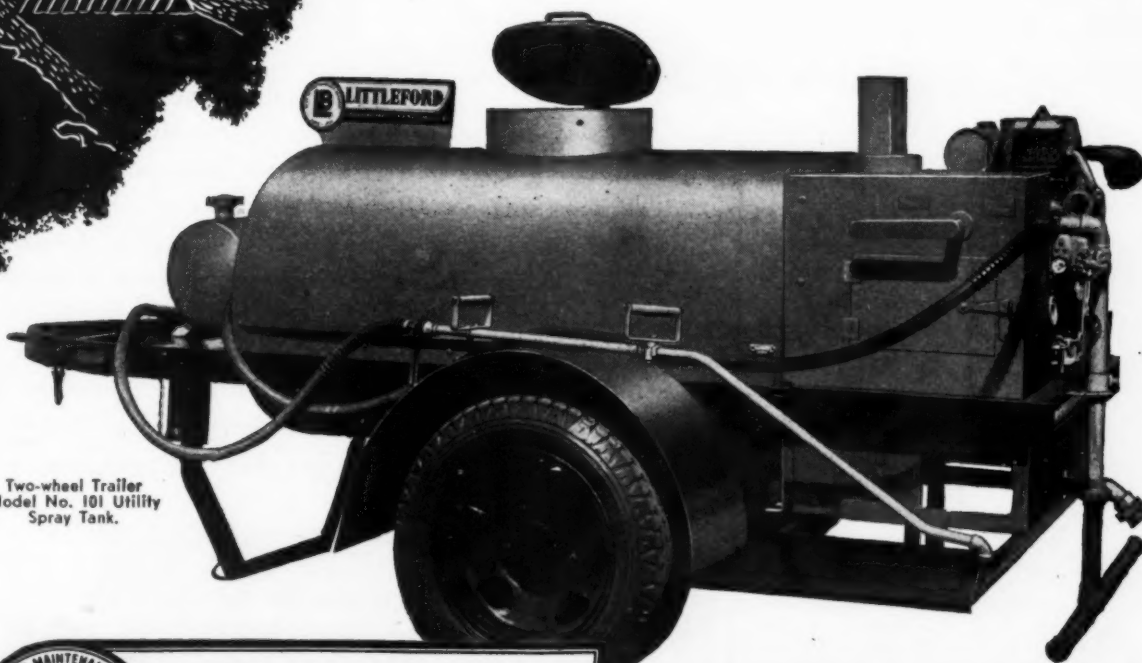
Truck mounted No. 101 using Hand Spray Attachment.

When those Streets, Roads or Airport Runways need repair, the Littleford Model No. 101 Utility Spray Tank is just the unit for the job. It's a combination of three units in one—has Spray Bar for small application work, Hand Spray for patch work and a Pouring Pot Outlet for crack filling work.

No. 101 will handle Asphalt, Tar, Cut-Back, Road Oils and Emulsions. For real *Utility* be sure to use a Littleford No. 101 Utility Spray Tank.



Two-wheel Trailer Model No. 101 Utility Spray Tank.



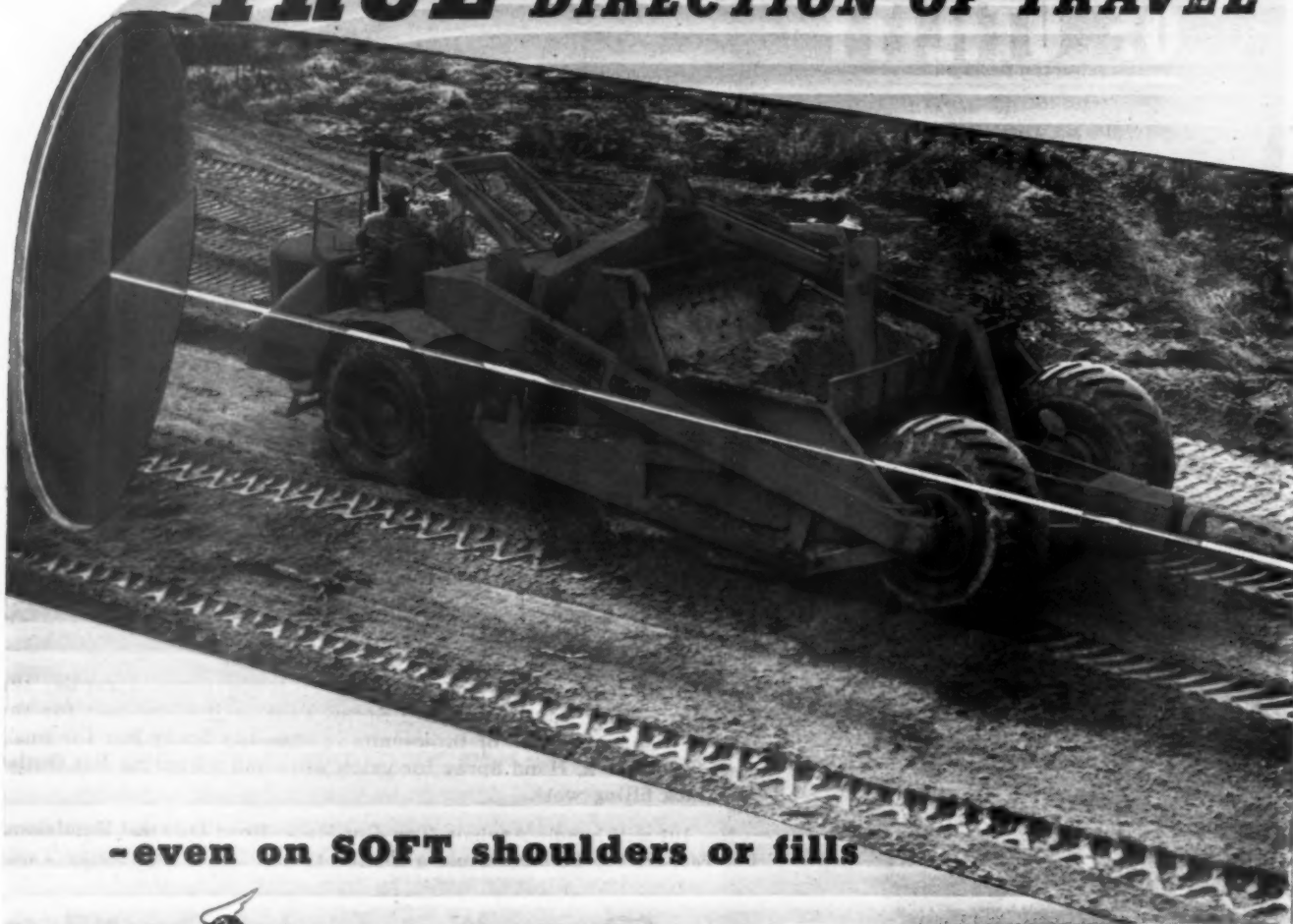
LITTLEFORD

LITTLEFORD BROS., Inc.

454 E. PEARL ST., CINCINNATI 2, OHIO

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EARTHMOVING EQUIPMENT

Includes



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Tractor-drawn for handling heaping yardages from 6 to 28 cu. yards.



★ POWER CONTROL UNITS

Single and multiple drum with universal or roller fairleads.



★ BULLDOZERS

Tough and rugged design for standard makes of tractors.



★ TRAILBUILDERS

Adjustable angle-blades for standard tractor mounting.



★ RIPPERS

Available in light, medium and heavy duty models with two sizes to each model.

DISTRIBUTOR SALES & SERVICE FACILITIES IN ALL PRINCIPAL AREAS & FOREIGN TERRITORIES

Due to their exclusive, hydraulic steering system Wooldridge Terra-Cobras always maintain a fixed direction of travel over all types of ground including soft or slippery surfaces. Obstacles such as rocks, ruts or timbers in their path will not cause these high speed earthmovers to veer from their set course. A single steering bar permits operator to maintain positive *two-wheel* steering control from a fraction of a degree to a sharp angle turn. With no effort required, operators are able to maintain higher yardage averages throughout an entire shift. To keep yardages on the move investigate Wooldridge Terra-Cobras for your jobs—today!

WOOLDRIDGE
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SUNNYVALE • CALIFORNIA • U. S. A.

TERRA



**Hi-Speed Self-Propelled
EARTHMOVERS**



PLEASANT DREAMS

Every state or county highway engineer . . . every superintendent of streets . . . every contractor . . . every airport maintenance manager . . . can rest contented in the fact that HUBER Road Machinery is the answer to his dreams of low maintenance costs—plus a minimum outlay for equipment to do the job.

The HUBER MAINTAINER—"the one-man maintenance crew" is 8 machines in one—a broom, mower, patch-roller, one-way or V-type

snowplow, bulldozer, scraper, and lift-loader.

The new 3-wheel HUBER ROAD ROLLER is a versatile machine that gets jobs done in a hurry. It is built in sizes from 5 to 14 tons.

And . . . there's a new HUBER TANDEM for every type of work . . . from 3 to 12 tons.

Make your plans to standardize on HUBER Road Machinery—and make sure your dreams of lowest possible maintenance costs come true.

THE **HUBER** MFG. COMPANY • MARION, OHIO, U. S. A.

HUBER ROAD ROLLERS MAINTAINERS

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PRIMED for PERFORMANCE ...ALWAYS with

SINCLAIR Specialized Lubricants



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OPALINE MOTOR OIL . . . for engines . . . fortified with additives to resist oxidation, sludge, gum, and bearing corrosion.

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OPALINE CHASSIS LUBRICANT . . . a tough, sturdy lubricant that protects while it lubricates . . . in spite of rain, snow and mud.

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FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, N. Y.

THE NEW GALION NO. 102 MOTOR GRADER

*It has
everything*



This New GALION Heavy-Duty Grader has--

- Combination Manual and Hydraulic Steering
- Great Tractive Power
- Tremendous Blade Pressure
- Large, Heavy-Duty, Low Pressure Tires-- same size front and rear
- Finger-Tip Control
- Quick, Responsive Action
- Increased Ruggedness

You get these features in super-measure. They help you get your big jobs done fast and profitably. The NEW Galion No. 102 is designed and built to give top performance under the strains and stresses of power, pressure, and rough going on heavy work schedules that allow no letup.

A demonstration will quickly convince you. Galion Distributors are located everywhere--write for the name of the one nearest you.

THE GALION IRON WORKS & MFG. CO.
Galion, Ohio, U. S. A.



To be "up" on the newest thing in motor graders, write for copy of new catalog No. 290. To be in line for delivery, place your order without delay for a NEW Galion No. 102 Motor Grader.

GALION

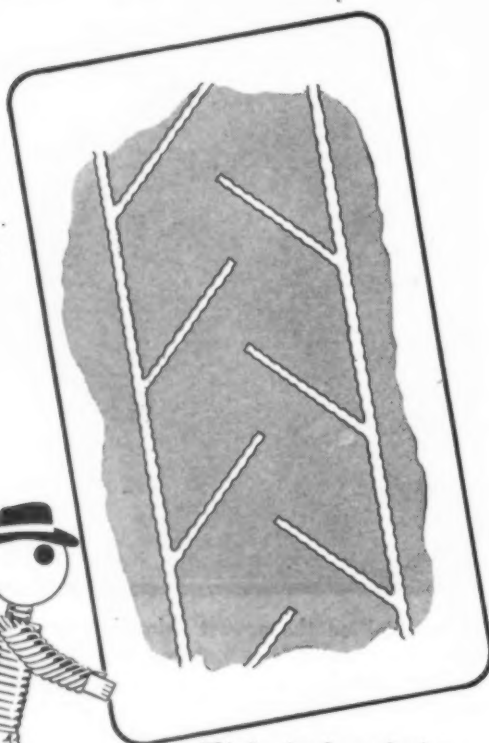
IRON WORKS

GRADERS • ROLLERS



TONCAN IRON SUBDRAINAGE PIPE

***Stops Ground Water
from Ruining Highways***



This drawing shows a herringbone type of subdrainage system used under highways.



No matter what you pay for highways—\$3,000 or \$30,000 per mile—they are doomed to premature failure unless troublesome ground water is eliminated.

Alternate freezing and thawing of water causes roads to heave, crack or break into pieces. But it is easy to conquer this troublesome condition by using Toncan CorWel or Toncan Perforated Pipe for subdrainage. Either of these products will get rid of ground water and keep the subgrade dry. This helps insure long life for highways and low maintenance costs.

Toncan Iron Perforated and Toncan Iron CorWel Pipe are made from rust- and corrosion-resisting Toncan Iron, an alloy of highly refined open hearth iron, molybdenum, and twice as much copper as found in copper bearing irons. Both of these products are flexible, able to withstand heavy external loads without cracking and crumbling so common with rigid type pipe.

Toncan Iron Perforated Pipe for subdrainage is available in 6 to 30-inch diameters. Any desired length is available in 2-foot multiples, 16 or 14 gauge. Complete line of fittings available.

CorWel Pipe is made in 6-inch diameter, 18 or 16 gauge Toncan Iron. Lengths to 24 feet. Helical corrugations. Galvanized after complete fabrication. Full line of fittings available.

Plan to protect the highways you build with Toncan Iron Subdrainage Products. A Toncan Iron man will be glad to place his specialized experience at your disposal.

Toncan Culvert Manufacturers' Association

1112 Standard Bank Building, Cleveland 13, Ohio

Toncan Iron... A product of Republic Steel Corporation

These Toncan Iron Drainage Products offer efficiency and economy:

CORRUGATED METAL PIPE • PERFORATED CORRUGATED METAL PIPE • CORRUGATED METAL PIPE ARCH • CORWEL SUBDRAINAGE PIPE
SECTIONAL PLATE PIPE • SECTIONAL PLATE ARCHES • SECTIONAL PLATE PIPE ARCH • FLOOD GATES

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put more in the
Profit Pocket...



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quick pick-up . . . high working speeds . . . fast maneuvering . . . more trips per shift.

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easier on engine and tractor . . . more time on the job . . . less in the shop.

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electric starting and operation on Diesel fuel . . . go to work quicker.

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Maintain high torque over a wide speed range . . . hang-on in tough going . . . less operator fatigue!

The way of all costs is DOWN with Allis-Chalmers 2-Cycle Diesel Tractors . . . the way of PROFITS UP!

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TRACTOR DIVISION — MILWAUKEE 1, U. S. A.

FOUR 2-CYCLE DIESEL MODELS
HD-7, HD-10, HD-14, HD-14C (Torque Converter)
60 to 132 Drawbar H.P.

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HOW CLEVELAND WAGON DRILLS WILL SPEED YOUR JOBS!



DRILL AT ANY ANGLE... The DR30 will drill flat holes from 4" to 8' above ground, plus straight up or down or *any direction*.

LARGE FEED CAPACITY... Over 8' permitting 6-foot steel changes; the DR30 handles depths to over 25'.

RECOIL DEVICE SPEEDS YOUR DRILLING... It holds machine to the work and cuts drilling time from 10% to 25%.

FORWARD LEG POINT holds the drill and steel in line whether operating in down, flat or angle holes.

CENTRALIZER KEEPS STEEL FROM "WALKING" ... When starting hole the centralizer on the DR30 holds the steel in place, preventing breakage of bit points.

EASY MOVEMENT OF U-BAR... The twin jack-screw mechanism permits easy moving of U-bar, and also shortens set-up time.

MAIN WHEELS SWIVEL 90° for line drilling, and 180° in order to obtain narrower tread.

• Write for
Bulletin 132

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THE CLEVELAND PNEUMATIC TOOL COMPANY
CABLE ADDRESS: "ROCKDRILL" • CLEVELAND 5, OHIO

Leaders-

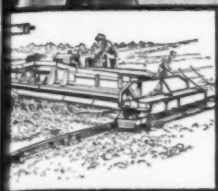
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FAST... LOW COST
STREET PAVING WORK

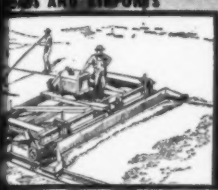
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Blaw-Knox

STEEL (UNIVERSAL) FORMS

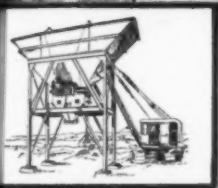
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BLAW-KNOX
RIBBON
PAVING
EQUIPMENT



SPREADING MACHINES FOR
ROADS AND AIRPORTS



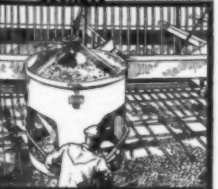
PAVING MACHINES FOR
ROADS AND AIRPORTS



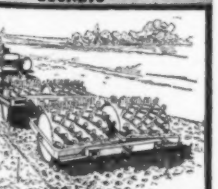
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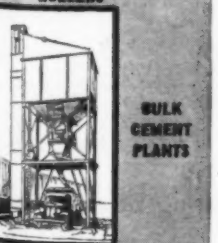
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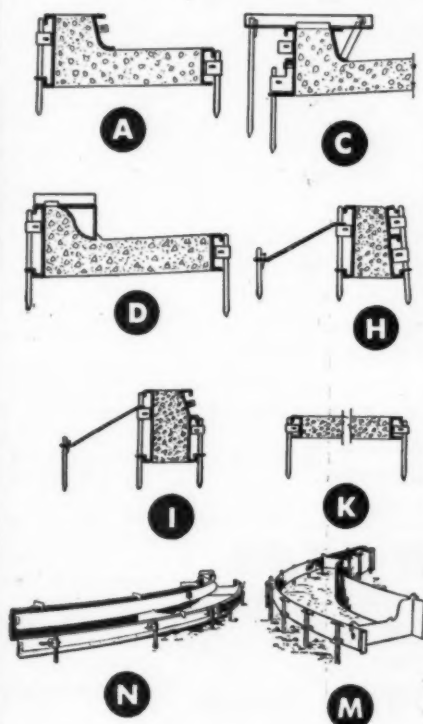
From municipal paving — to real estate development — or for the occasional paving job.

BLAW-KNOX STEEL FORMS give a high dollar return value. Thousands of contractors use Blaw-Knox Steel Forms for a great variety of work. Any design of concrete curb; curb and gutter; integral curb; sidewalk, etc., can be handled with standard Blaw-Knox form set-ups.

Easy to handle and use, they will do street paving work quicker and cheaper. The steel imparts a smooth finish to the concrete, eliminating the hand finishing always necessary when expensive wooden forms are tediously built for each job.

Blaw-Knox Steel Forms are built for long service, quick installation and dismantling; and are rigidly braced to hold their position when being filled with concrete.

Always ready for action — to use again and again.



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2003 Farmers Bank Building, Pittsburgh, Pa.

Send Prices on _____ Lineal Feet of _____

Send a Copy of
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(A, B, C, etc.)

Company _____

Address _____

City _____ State _____

Ford Trucks Last Longer

TRUCK-ENGINEERED • TRUCK-BUILT • BY TRUCK MEN



"WE BELIEVE ONLY FORDS CAN DO THIS WORK AT THE SAME LOW COST"

The statement above is quoted from a letter received from Mr. C. A. Hurt, of Rock Hill Quarries Company, St. Louis, Mo. It sums up, we believe, the reasons why so many stone products producers and handlers look to sturdy Ford Trucks for thrifty transportation in their operations. Mr. Hurt describes his company's operation—

"Our twelve Ford Trucks haul crushed stone to street and road jobs. On new work, they often have to pull over new fills or back up on severe grades to put the stone where contractors want it."

"We have been using Ford Trucks

since 1937, hauling an average of six tons per load. We believe they are the only trucks that can do this work for the same low cost per ton-mile. When we require Ford parts, the fact that Ford dealers are so near and parts so inexpensive makes this item negligible in our costs."

The new Ford Trucks now being built are the best in Ford history. Of especial interest is the new Ford Dump Truck Chassis, available with either the 100 HP V-8 or the 90 HP six-cylinder engine. Check its performance and capacity figures with your Ford Dealer. We believe you'll agree it's a real profit-earner.

FORD TRUCKS

MORE FORD TRUCKS IN USE TODAY THAN ANY OTHER MAKE

Ford

FORD ADVANCED ENGINEERING!

THE FAMOUS V-8 ENGINE, for toughest service, new 100 HP, with NEW steel-cored Silvaloy rod bearings for trebled endurance • NEW Flightlight aluminum alloy 4-ring pistons for added oil economy • Tougher, rust-proofed valve springs • NEW moisture-sealed distributor • NEW coolant-saving radiator closure • Auto-balanced carburetion for still more thrifty power • Servicing simplified still further. And the rugged, thrifty 90 HP Ford six-cylinder engine, for stop-and-go jobs, with many important advancements, available in all except C.O.E. chassis.

Ford Truck rear axles—world-famous for load-lugging—provide generous reserve capacity • Light duty chassis have sturdy $\frac{3}{4}$ -floating axles with triple-roller-bearing, straddle-mounted pinion; full-floating axles in all other chassis • 2-speed axle and vacuum power braking for 2-ton rating • Improved 4-speed transmission at extra cost in light duty chassis, standard in all others.



LOADERS

When

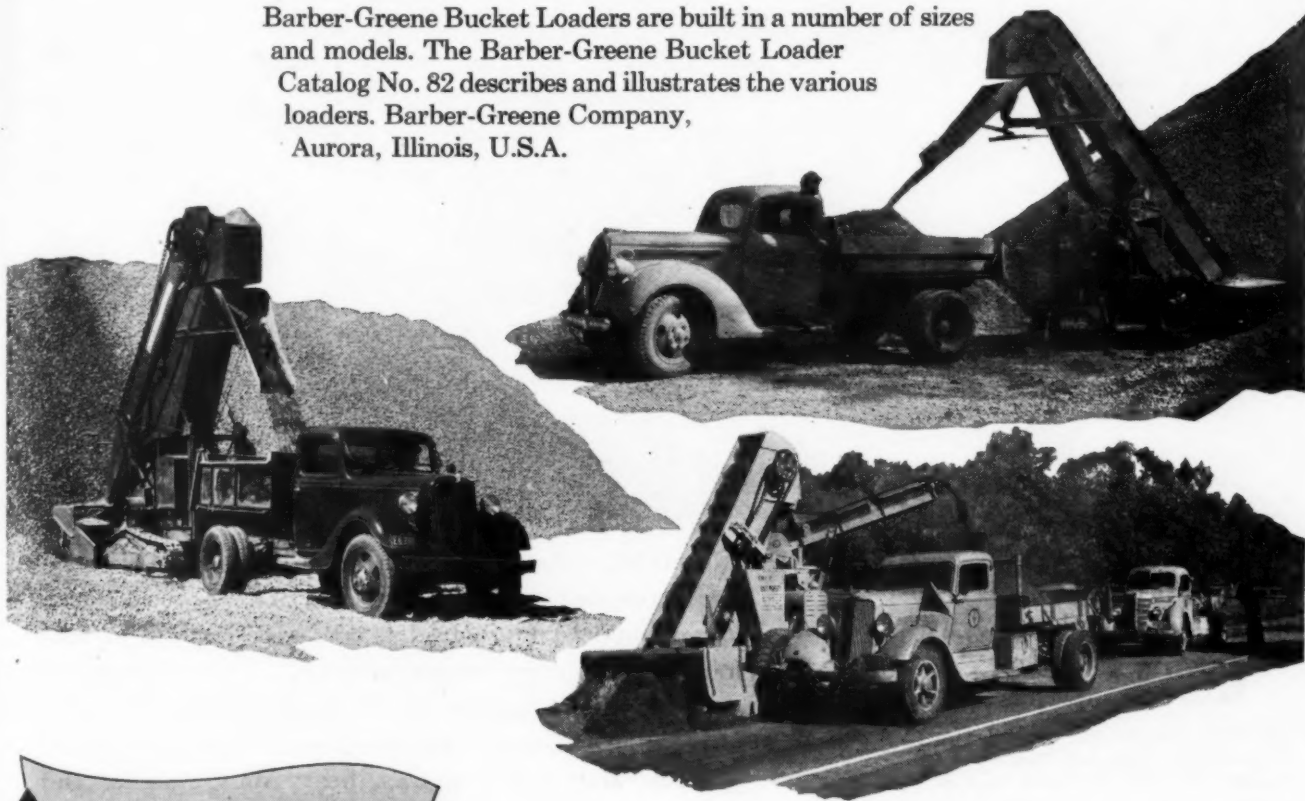
Why a *Bucket Loader* Produces Profit the Year Around

"Versatility" best describes the Barber-Greene Bucket Loader—versatility not only in materials it can handle, but in handling these materials throughout the year.

In the spring, the B-G Bucket Loader is used in conjunction with a blade grader and truck for shoulder clean-up, curve widening, contouring, etc. In the summer, it handles aggregates for asphalt patching, street graveling, etc. In the fall, as winter approaches, it is ideal for handling cinders and sand.

In the winter, when conditions are really tough, the Barber-Greene Bucket Loader can be relied upon to dig into frozen stock piles, break up the lumps, and load the distributing trucks for prompt action in meeting icy conditions.

Barber-Greene Bucket Loaders are built in a number of sizes and models. The Barber-Greene Bucket Loader Catalog No. 82 describes and illustrates the various loaders. Barber-Greene Company, Aurora, Illinois, U.S.A.



CONSTANT FLOW EQUIPMENT

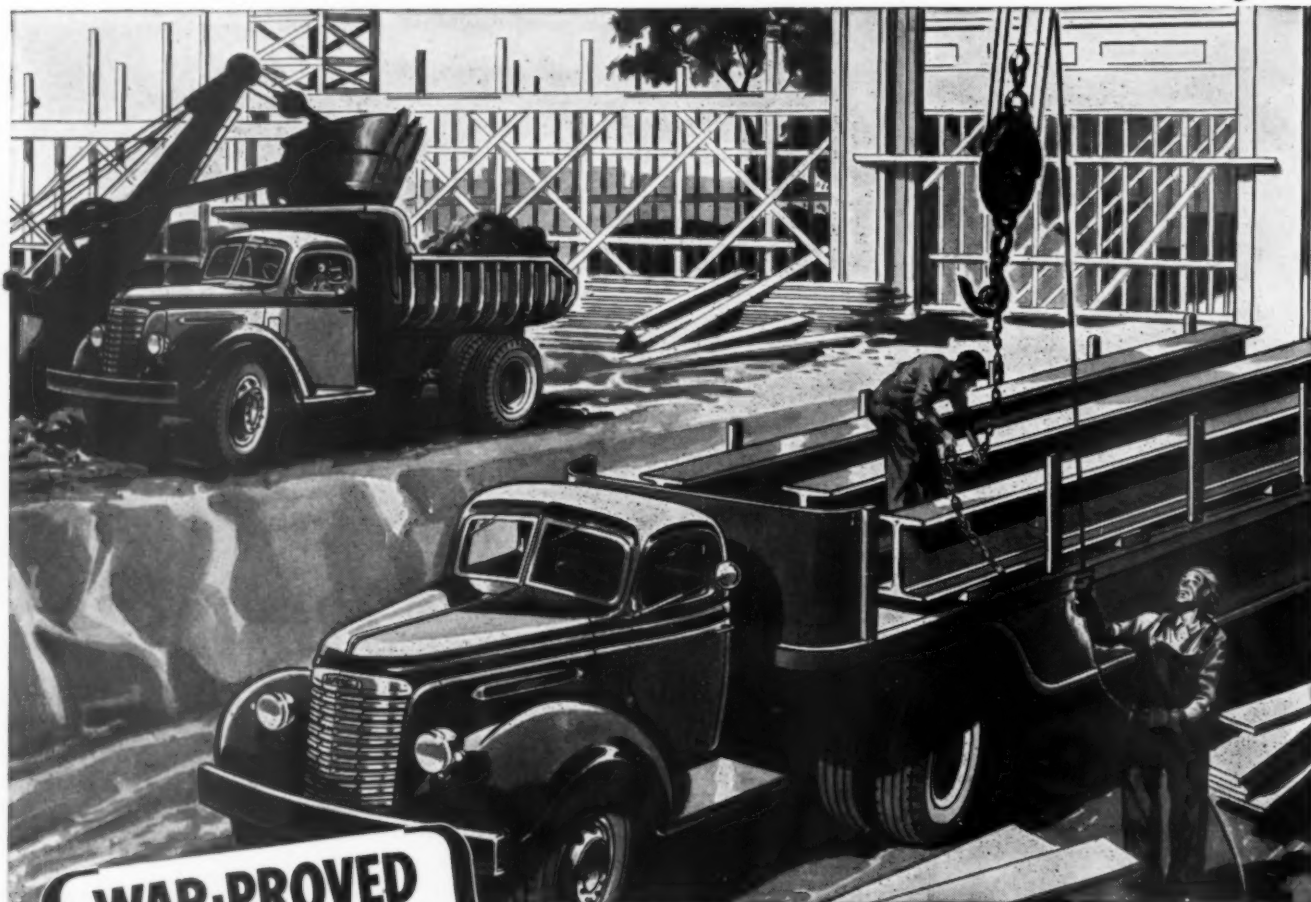


LOADERS • PERMANENT CONVEYORS • DITCHERS • PORTABLE CONVEYORS • FINISHERS • BITUMINOUS PLANTS • COAL MACHINES

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27

NEW GMCs *for Heaviest Hauling*



**WAR-PROVED
and IMPROVED
FOR 1946**

• Powerful, economical "Army Workhorse" engines of Valve-in-Head design with Tocco-hardened Crankshafts, Airplane type "Durex" Main Bearings, Heat-resisting Exhaust Valves with Improved Valve Seat Inserts, Positive Crankcase Ventilation, Turbo-Top Pistons and Full Pressure Lubrication through Rifle Drilled Connecting Rods.

• Rugged, built-for-the-job chassis with extra strong Frames, Springs and Axles, heavy duty Transmissions and Clutches, Needle Bearing Universal Joints, Recirculating Ball-Bearing Steering and powerful, easy-action Brakes.

• Rider Ease Cabs with Cradle-Coil Cushions, Wide Visibility "V" Windshields, Quick-vision Instrument Panels, All-Weather Insulation and Controlled Ventilation.

New GMCs offer you the most in heavy duty truck value in a most complete selection of models. There are tractor units, dump models, four-wheelers and six-wheelers in tonnage ranges to fit every requirement . . . and with equipment options which include worm, double reduction and dual drive axles, 5-speed underdrive and overdrive transmissions, gasoline and diesel engines, heavy duty clutches and air brakes. It will pay you to investigate GMC. For, whatever you haul . . . sand and gravel, cement, ore, steelwork, heavy construction equipment and many more . . . you'll find a war-proved, improved GMC truck ideally suited to the job.

THE TRUCK OF VALUE



**GASOLINE
DIESEL**

GMC TRUCK & COACH DIVISION • GENERAL MOTORS CORPORATION

Look to HANSON

for THE BEST in earth-handling equipment

EXCAVATORS—that really produce. In $\frac{3}{8}$ yard and $\frac{1}{2}$ yard sizes (Models 31 and 41). The excavator that can Hoist, Crowd and Swing or Propel and Steer all at the same time!

This design feature will enable you to handle more yards per hour—make more dollars per hour.

Other Hanson features that mean dependable, profitable operation on your excavating jobs—

Full revolving. Chain crowd. Low center of gravity. Welded steel construction. Large area crawlers. Timken roller bearings.

CRANES — that make money for you. In $4\frac{1}{2}$ ton and $6\frac{1}{2}$ ton sizes—Gasoline or Diesel.

It's a crane that has demonstrated its rugged strength time and again. It's the outgrowth of 30 years experience in this machinery field, combining scientific design and manufacturing skill. A study of these features — a short conversation with a Hanson owner will convince you that Hanson is the buy!

Convertible to: Shovel, Trench Hoe, Dragline, Clamshell, Piledriver.

All ways a producer — always dependable.

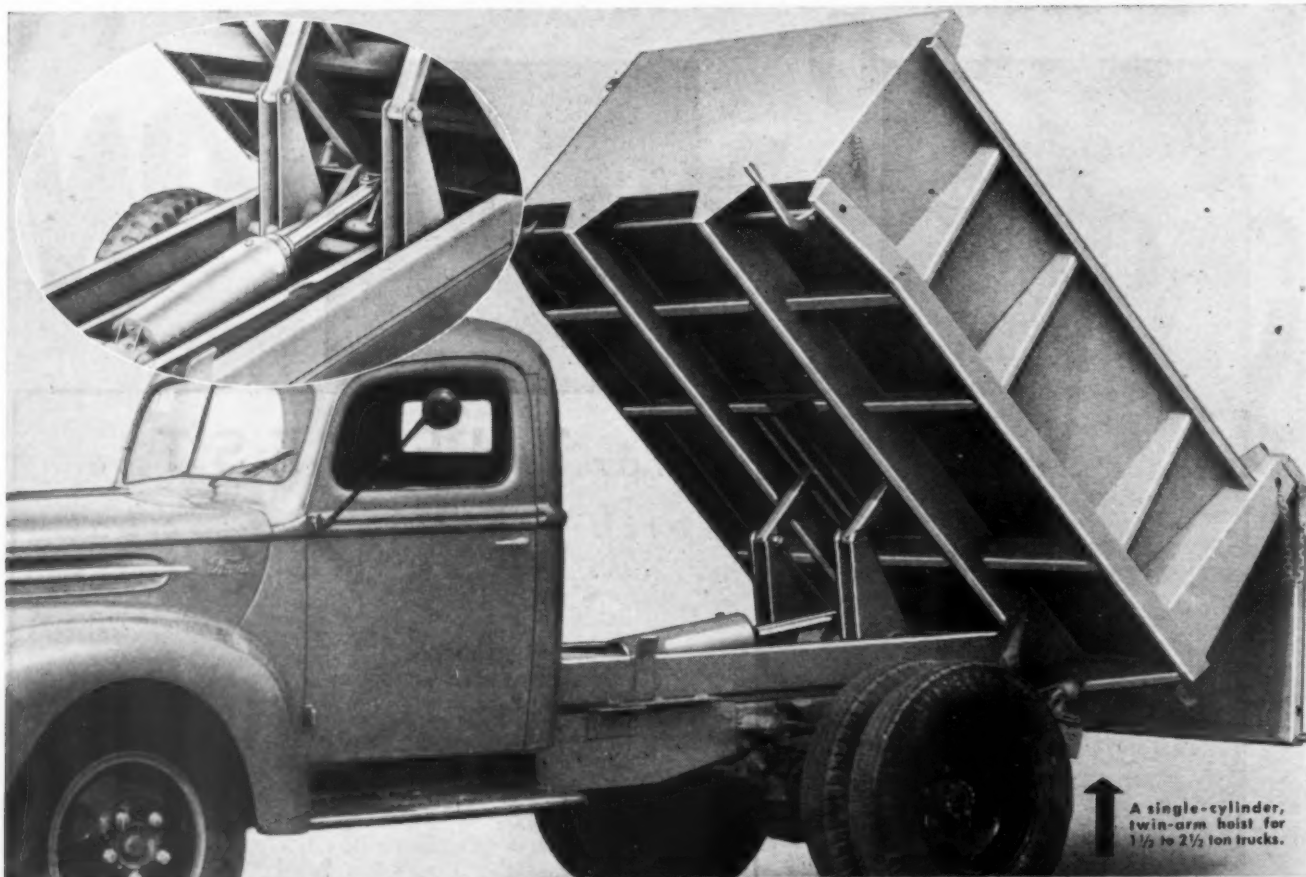
OTHER HANSON PRODUCERS

- (1) **Truck shovels and Cranes.**
Shovels and cranes shown above (Models 31 and 41) are also available as truck mounted instead of crawler mounted.
- (2) **Yard & Dock Cranes**
A mobile, one-man unit, 2-ton lift and 4-ton carry, 360° swing, 2 to 40 M.P.H.
- (3) **Heavy Duty Trailers**
Ideal for hauling contractors' heavy equipment. Available as either semi or full trailer with capacities from 10 to 40 tons. Gooseneck type, massive H beam construction—tough as Gibraltar! Oscillating rear axle construction assures a level, safe ride. Just the answer to your equipment haulage problem.

Write for Catalog RS-66 on any or all of this equipment.



THE **HANSON** CLUTCH AND
MACHINERY CO.
TIFFIN • OHIO



↑ A single-cylinder, twin-arm hoist for 1½ to 2½ ton trucks.



↑ A twin-cylinder, twin-arm hoist for 8 to 20 ton trucks.



↓ A twin telescopic hoist for rock and ore bodies.

BH-117

Heil Bodies and Hoists are built to lick the

Tough Jobs

The ability of Heil Bodies and Hoists to give you extra years of profitable service has been proved wherever tough working conditions test soundness of design and quality of materials.

Heil units are built to take the punishment of the tough jobs . . . to give you quick, clean dumping under all operating conditions . . . extra speed that enables you to haul more loads per day . . . and more profit on every load you haul.

Compare such features as the heavy-duty sub-frame . . . reinforced body floor . . . simple arm construction . . . precision-machined pump . . . etc. — and you see why Heil quality construction assures you of dependable, profitable service with a minimum of "time out" for service and repair.

For complete details, see your Heil distributor.



THE HEIL CO.

GENERAL OFFICES

MILWAUKEE 1, WISCONSIN

**10 TONS
of dependability**

Powerful Gasoline or Diesel Engine

Effortless Hydraulic Steering Mechanism

Conveniently Located Operating Controls

Roll Material of Highest Quality

Oversize Gear Train ... Powerful Travel Clutches

MMK 105
AUSTIN-WESTERN
AURORA, ILL.

Thousands of owners and operators will tell you "Austin-Western Rollers stay on the job day after day, and month after month, with less time lost for mechanical adjustments, maintenance and repairs". That's **DEPENDABILITY!** Add to it the precision job of rolling that results from such features as Proper Weight Distribution, Vibrationless Power Units and Smooth Acting Clutches, and you have an unbeatable combination. Why take less in a Road Roller?

AUSTIN-WESTERN COMPANY, AURORA, ILLINOIS, U. S. A.

BUILDERS OF ROAD MACHINERY

Austin  **Western**

SINCE 1859

America's finest Highways are reinforced with **TRUSCON WELDED STEEL FABRIC**

Everywhere across the country—up in the mountains, down in the valleys, along the seaside—mile after mile of America's finest concrete highways are reinforced with Truscon Welded Steel Fabric.

These highways can be depended upon to provide long, economical life because Truscon Welded Steel Fabric offers these advantages to concrete:

Provides resistance to cracking due to shrinkage of concrete during setting period.

Provides tensile strength necessary to resist subgrade friction caused by expansion and contraction of the concrete slab.

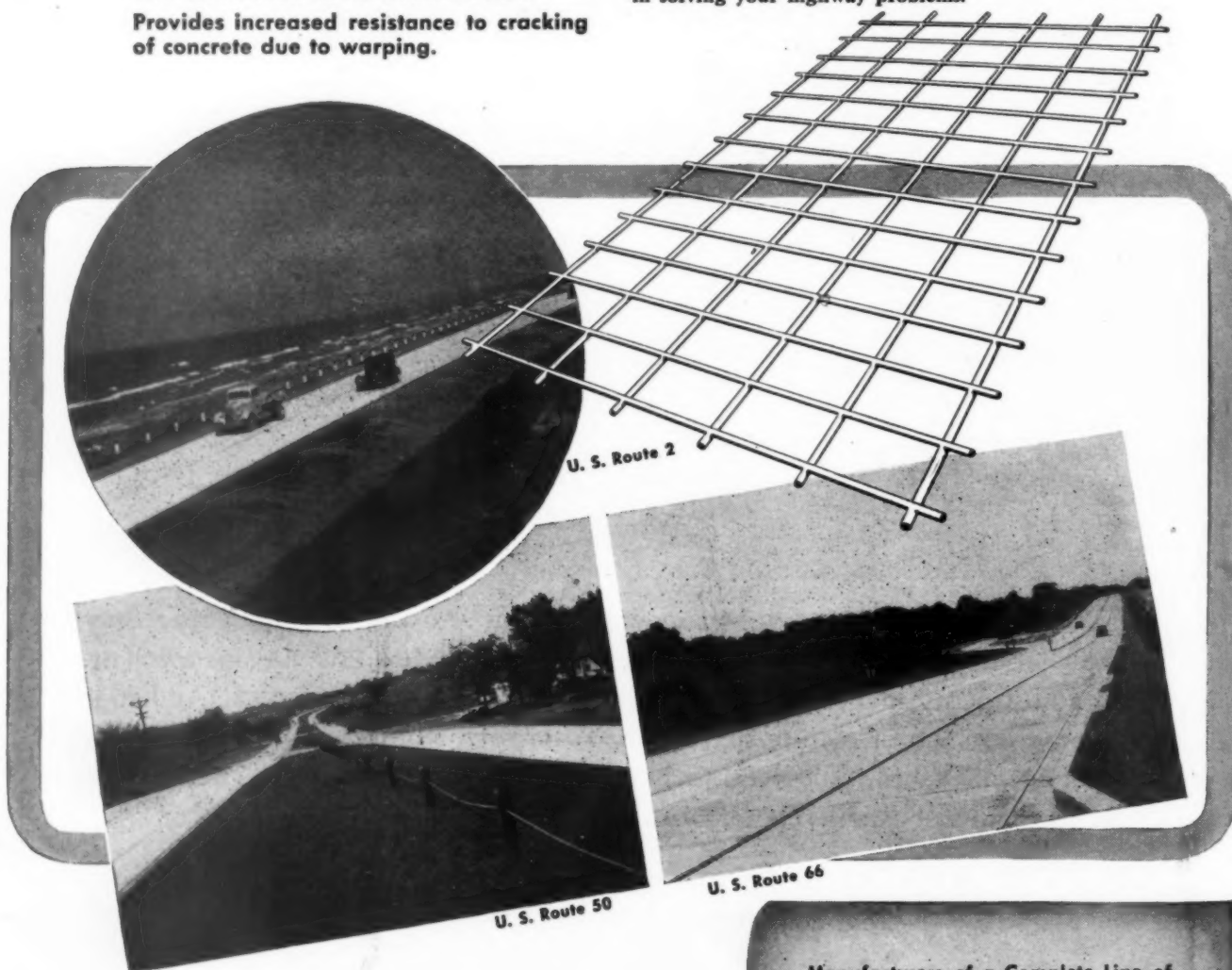
Provides increased resistance to cracking of concrete due to warping.

Provides resistance to the development of microscopic cracks into visible cracks.

Provides resistance to cracks opening and allowing entrance of water.

Provides resistance to broken ends of slabs separating at a crack.

For strong, durable highways, plan to use Truscon Welded Steel Fabric and associated road building products. That way you can be sure of smooth, durable roads which will better serve your community and increase your prestige. An experienced Truscon highway engineer will be glad to assist you in solving your highway problems.



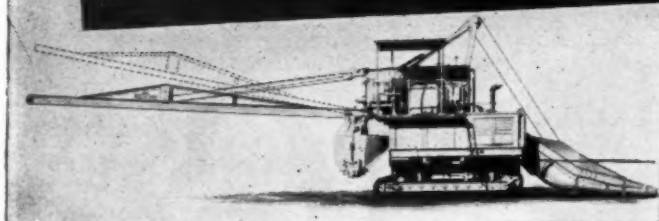
TRUSCON STEEL COMPANY

Reg. U. S. Pat. Off.

YOUNGSTOWN 1, OHIO • Subsidiary of Republic Steel Corporation

Manufacturers of a Complete Line of
Welded Steel Fabric . . . Concrete Bars
. . . Contraction Joints . . . Dowel As-
sembly Units . . . Curb Bars . . . Com-
plete Steel Buildings.

Let's Get the Terms Straight!



MULTIFOOTE STANDARD BOOM

Both single- and double-drum MultiFoote 34-E Pavers are equipped for raising and lowering the boom by power to pour low elevation headwalls, abutments, retaining walls and the like. This boom is *not* extra-cost equipment, but is equal to or better than similar booms, sometimes called "live," "angle," "slope," or "inclined."

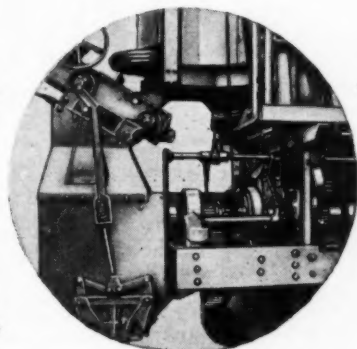
MULTIFOOTE ELEVATING BOOM



Special equipment on a MultiFoote Paver to get full-load pouring up to 18½ feet above ground level. Extra heavy clutch and hoisting mechanism to handle fast bucket travel with boom elevations up to 40°. . . *There is no other paver boom like this*, no matter what the terminology may be. Available for all MultiFoote 27-E and 34-E Single- and Double-drum Pavers.

The Differences are Here

Right—The special MultiFoote Elevating Boom hoist mechanism. Over-size brake, clutch and hoist drum to haul up full loads on steeply elevated boom with the same MultiFoote dependability you expect from the rest of the machine.



. . . and Here

Left—Special bucket with brackets to allow leveling bucket on elevating boom. Bucket doors can be operated from paver platform, or by special hand release at the bucket.



...on Concrete Paver Booms

LET'S get the terms straight! Powered raising and lowering paver booms are called by too many names . . . And the confusion could be costly to you. There are two different powered MultiFoote Paver booms, which are described here. In telling you what they are and what you can expect of them on your jobs, we hope to clear up any possible question about Foote standard and elevating booms. Naturally, we think the MultiFoote is the best all-around paver available . . . And you road-builders back us up by putting more of them on the job than any other paver. For complete data on all new MultiFoote models, see your MultiFoote Distributor or write us direct.

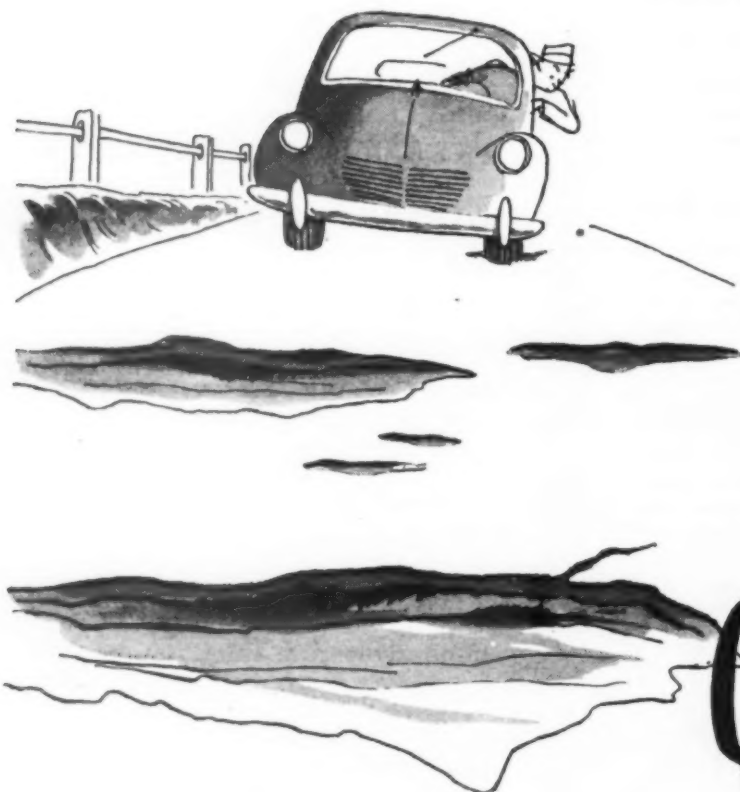
THE FOOTE COMPANY, INC.
1936 STATE ST., NUNDA, NEW YORK

MULTIFOOTE

27-E and 34-E Single Drum
34-E DuoMix (dual drum)

Concrete Pavers

How much will it cost?



16
billion
dollars!

Converting the nation's bad roads into the efficient highways demanded by modern traffic standards presents a gigantic challenge to the people of America. Testimony in support of the Federal-Aid Highway Act of 1944 estimated that it would cost 16 billion dollars to satisfactorily improve all categories of highways.

As a first step in the right direction, huge sums are being spent on road building. What plans are you making for the highways serving your state, your community?

Black top construction can economically solve most of your highway problems: construction of main high-

ways with a sound base and a tight, dense, durable wearing surface; smooth, economical farm to market secondary roads utilizing local aggregates or soil-stabilized bases; rejuvenation of existing roads by applying proper surface treatment; surface maintenance by immediate patching of holes and breaks.

Many types of highway work can be done better with Tarmac than with any other material. Write for the new booklet "Surfacing with Tarmac" which describes the various types of construction and maintenance possible with Tarmac.

KOPPERS COMPANY, INC.

TAR AND CHEMICAL DIVISION • PITTSBURGH 19, PA.

AIR PLUS JAEGER COMPRESSOR

here's one cost
that's lower...

JAEGER AIR

Pre-war dollars never bought compressed air as cheaply as you now produce it with a Jaeger AIR PLUS.

Lower fuel cost: Precision built and balanced, with positively leak-proof valves of twice the usual size and the latest type Continental, International or Caterpillar power, these units deliver full rated capacity of air with less effort and lower fuel consumption than any compressor you have ever operated.

Lower cost of upkeep: Compressor unit and engine are both built to the same standards, with interchangeable parts, force feed lubrication and advanced engineering thruout. Jaeger's "ultra lapped" valves, for example, operate indefinitely without carbon and for 10 times the usual length of life. Clutch, main bearings, truck, frame, etc, are designed for lifetime service on the most rugged work.

Extra years of service — a major saving in replacement cost: In addition to the long-life service of America's finest makes of gasoline or diesel engine, Jaeger gives you a compressor unit that operates at slower piston speeds and cooler temperatures than others and will outlast its original power plant, plus a second, AND A THIRD.

Why buy an obsolete Compressor when you can get a modern, more dependable, more economical Jaeger? Sizes 60 to 500 ft. Sold and serviced in 120 cities. Ask for Catalog JC-5.

THE JAEGER MACHINE COMPANY

Main Office and Factory: Columbus 16, Ohio

REGIONAL OFFICES

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JAEGER *Engineered* EQUIPMENT



"FLEET-FOOT"
Loaders



"SPEEDLINE"
Concrete Mixers



"SURE PRIME"
Contractors Pumps

JAEGER-LAKEWOOD SPREADERS, FINISHERS AND BITUMINOUS PAVERS, FORMS, FORM TAMPERS—"DUAL-MIX" TRUCK MIXERS, AGITATORS—JAEGER HOISTING ENGINES, TOWERS



Engineering Research has Built Safety and Economy into **CONCRETE PAVEMENTS**

FOR nearly a quarter of a century portland cement concrete pavements have been carrying a large share of the nation's rapidly growing motor traffic, *safely and at low annual cost.*

The outstanding performance of concrete pavements is the result of years of research and engineering analysis carried on by federal, state, county and city engineers, engineering colleges and technical organizations. The Portland Cement Association is contributing to this highway technology through its continuing research work and educational programs.

As a result of the engineering advances made, concrete pavements usually *cost less to build* than other pavements of equal load-carrying capacity. They require *minimum maintenance* expense to carry safely the

ever-increasing volume of motor vehicles.

In addition to being the *lowest annual cost pavement* for all but the lighter traffic, concrete's skid-resistant, light reflecting surface makes it the *safest pavement* as well.

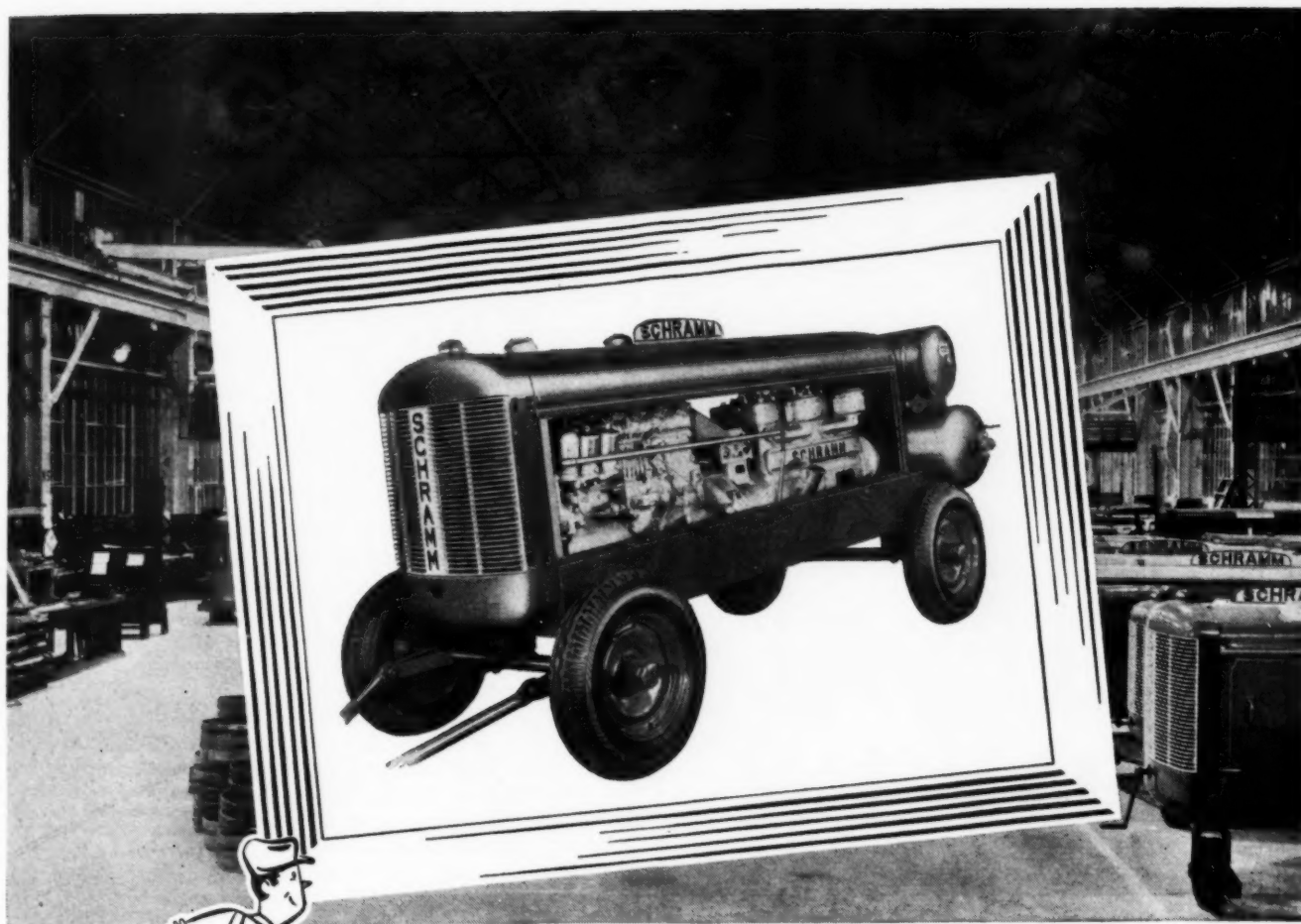
Gasoline tax and motor vehicle funds will buy more highway service per dollar when invested in concrete pavements for inter-regional and main rural highways and for principal city streets.

Send for free copy of new 108-page book, "Concrete Pavement Design," for roads and streets carrying all classes of traffic. Distributed only in United States and Canada.

PORTLAND CEMENT ASSOCIATION

Dept. 6-28, 33 W. Grand Ave., Chicago 10, Illinois

A national organization to improve and extend the uses of concrete . . . through scientific research and engineering field work



IN AIR COMPRESSORS...THERE ARE

Masterpieces, too

Specialized workers make Schramm Air Compressors with that all-important "Know-How". So, when you get your Schramm Air Compressor you know you are not only getting a compressor with many exclusive features, but you know Schramm workers are assembling the features right, testing them thoroughly, and making a Masterpiece!

Schramm, with its enlarged facilities and modern plant at West Chester, produces on a large scale for industry. Schramm's expert workers and larger, modern facilities are geared to meet your needs for Air Compressors, both portable and stationary, in a wide range of sizes, for any requirements.

Today's features of Schramm Compressors are those that have stood up so well under the test of actual performance. These features include (1) 100% watercooled (2) mechanical intake valve (3) forced feed lubrication (4) push-button starting (5) compact and lightweight.

Post-war industry will find many uses for the versatile Schramm Air Compressor. We invite you to write today for our new catalog and become acquainted with the construction features and details of the many Schramm models.

SCHRAMM INC.

**THE COMPRESSOR PEOPLE
WEST CHESTER
PENNSYLVANIA**

When writing advertisers please mention → **ROADS AND STREETS, June, 1946**



DIESEL POWER



FEATURES of the GM "71" DIESEL

- Compactness
- Quick starting under all conditions
- 2-cycle, smoother operation
- Easy accessibility of wearing parts
- Unit injectors—no high-pressure piping
- Maximum parts interchangeability regardless of number of cylinders
- Uniflow performance at high altitudes

WHAT'S IN A NAME PLATE?

IN THIS CASE the name plate holds the secret of the satisfaction you will have with Diesel power.

For this name plate is evidence of some of the most intensive work ever undertaken in the General Motors Research Laboratories.

It started back when all Diesels were cumbersome, stationary engines. But the Diesel idea looked good. Maybe it could be made more useful. So GM experts went to work on it.

THEY MADE IT two-cycle—quick to respond to additional loads because power is furnished on every downward stroke of each piston. They eliminated all the old surplus weight and size of former Diesel engine practice and built in a more than ample supply of horsepower. They developed unit injection—did away with high-pressure fuel tubing. They designed Uniflow scavenging—made a clean-burning, efficient engine. Then to top it all, they simplified the design and made wearing parts easy to get at, and interchangeable even between engines with different numbers of cylinders.

ALL THIS has added up to today's sturdy, hard-working, money-saving GM Diesel—a Diesel that brought the era of the GM locomotive and its streamliners, a Diesel that has changed the picture of marine propulsion—an industrial Diesel ready to take on the toughest jobs of transportation, construction, fishing, mining, lumbering and anything else you have to offer. Yes, ready to take them on and do them more reliably, at lower cost.

A nation-wide organization of GM Diesel sales and servicing dealers stands ready to handle every need for parts and service.

DETROIT DIESEL ENGINE DIVISION.

DETROIT 23, MICH. •

SINGLE ENGINES . . . Up to 200 H.P.
MULTIPLE UNITS . . . Up to 800 H.P.

G E N E R A L M O T O R S

The BEST COSTS LESS

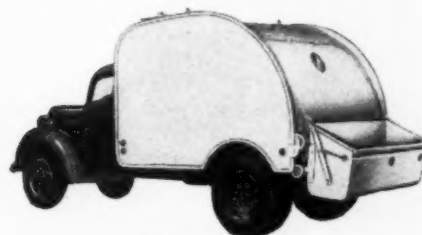
For years Gar Wood has consistently offered truck and trailer equipment of utmost utility and outstanding value. Leadership in this field resulted from this policy. Gar Wood equipment costs less in the long run because it is better built to give peak performance and lasting satisfaction.



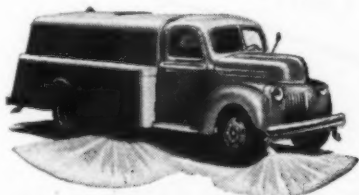
The Load Packer (patented) all enclosed garbage and refuse unit. Compresses loads hydraulically for maximum payloads.



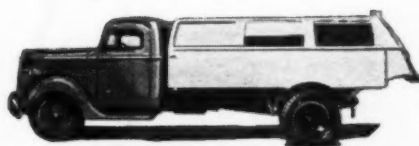
Type C28 scow end Garbage Body. Steel hinged covers extra equipment.



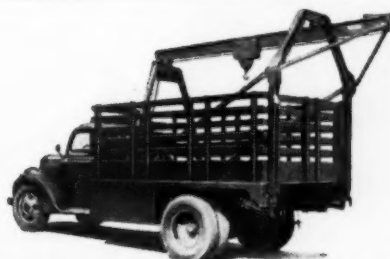
The new Bucket Leader, an all enclosed sanitary refuse disposal unit.



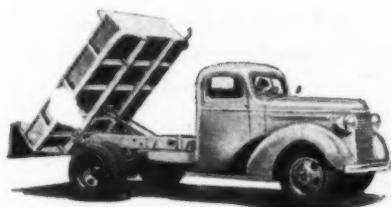
Street Flushers and Sprinklers.



Type C50 Garbage Body with sliding steel covers on each side.



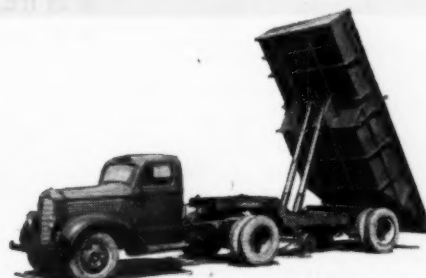
Model "QD" Tree-moving Crane. Easily erected or removed from all purpose stake body.



Type C12 Body and Model D6 or D7 Hoist. Dumping angle 55°.



Telescopic boom Crane. Boom radius 8 to 20 feet.



Special W28 Garbage Body, watertight top box. Capacity 7 cu. yds. Type T333 telescopic Hoist.



GAR WOOD INDUSTRIES, INC.

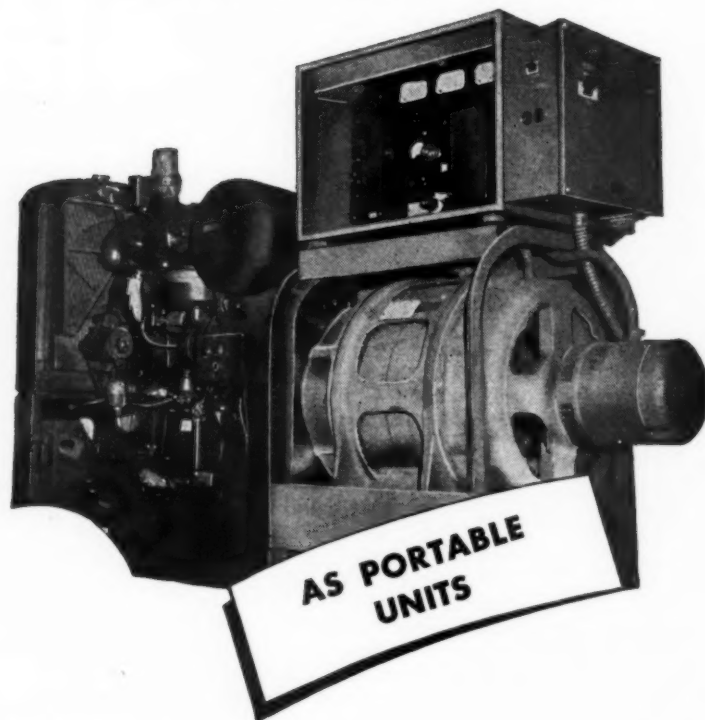
7924 RIOPELLE ST.

DETROIT 11, MICH.

WORLD'S LARGEST MANUFACTURERS OF TRUCK AND TRAILER EQUIPMENT
OTHER PRODUCTS: • TRUCK TANKS • ROAD MACHINERY • HEATING EQUIPMENT • MOTOR BOATS

ELECTRIC POWER UNITS

—*Mobile and Portable*



The War Assets Administration has priced for *immediate sale* 25 KVA gasoline-powered AC Generators—120 volts, single phase, 60 cycles—

- in trucks
- in trailers
- as portable units

- IN TRUCKS \$5487 or less*
- IN TRAILERS 3017 or less*
- PORTABLE 1987 or less*

(*depending on condition)

The mobile equipment is used but in good condition. Many separate units are unused, some are used but all are in good condition. They should be of particular interest to construction contractors and all users of electric power in the field.

F.O.B. Baltimore, Md.
San Francisco, Cal. or
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Write or phone your nearest War Assets Administration Regional Office for full information.

Trucks and Trailers
in Baltimore only.

WAR ASSETS ADMINISTRATION

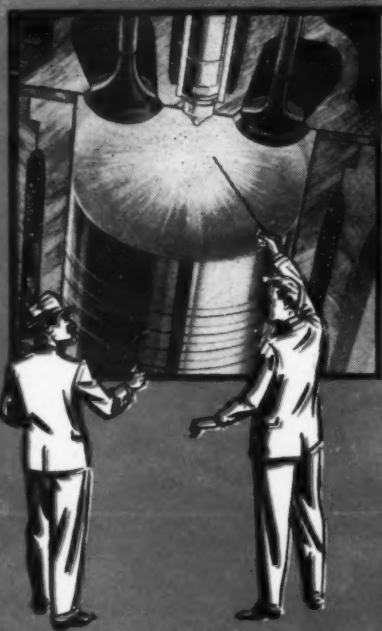
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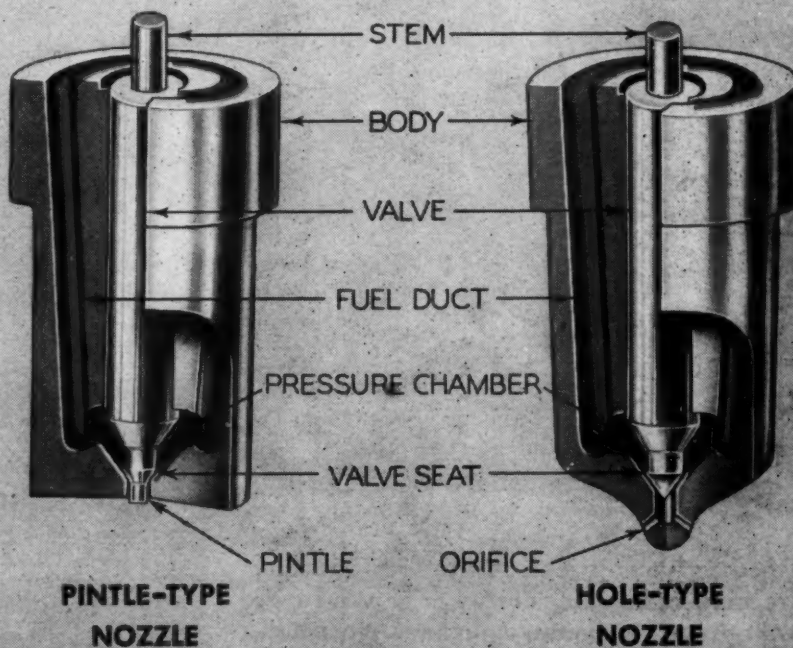
529

GOOD FUEL INJECTION

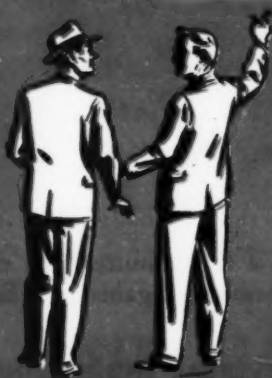
Requires a Tailored Spray



THE MAIN FUNCTION of an injection system is to deliver fuel to the engine cylinders in such a manner that it will burn efficiently. That's why the injection nozzle is so important. It must produce a spray that meets exactly the combustion-chamber requirements.



Tailoring is the art of producing the precise spray characteristic which the engine likes best. Tailoring know-how comes from long experience in correlating the selection of every part of the injection system for the single purpose of providing the engine with the ideal spray pattern.

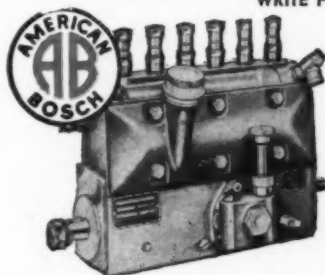


THE CORRECT PATTERN PAYS ITS WAY. American Bosch Injection Equipment provides tailored fuel sprays to fit your Diesel's combustion chamber. That means fuel economy, power to suit the task at hand, and satisfactory performance under all operating conditions.



WRITE FOR A COMPLETE DIRECTORY OF AMERICAN BOSCH AUTHORIZED SERVICE STATIONS

AMERICAN BOSCH CORPORATION, SPRINGFIELD 7, MASS.

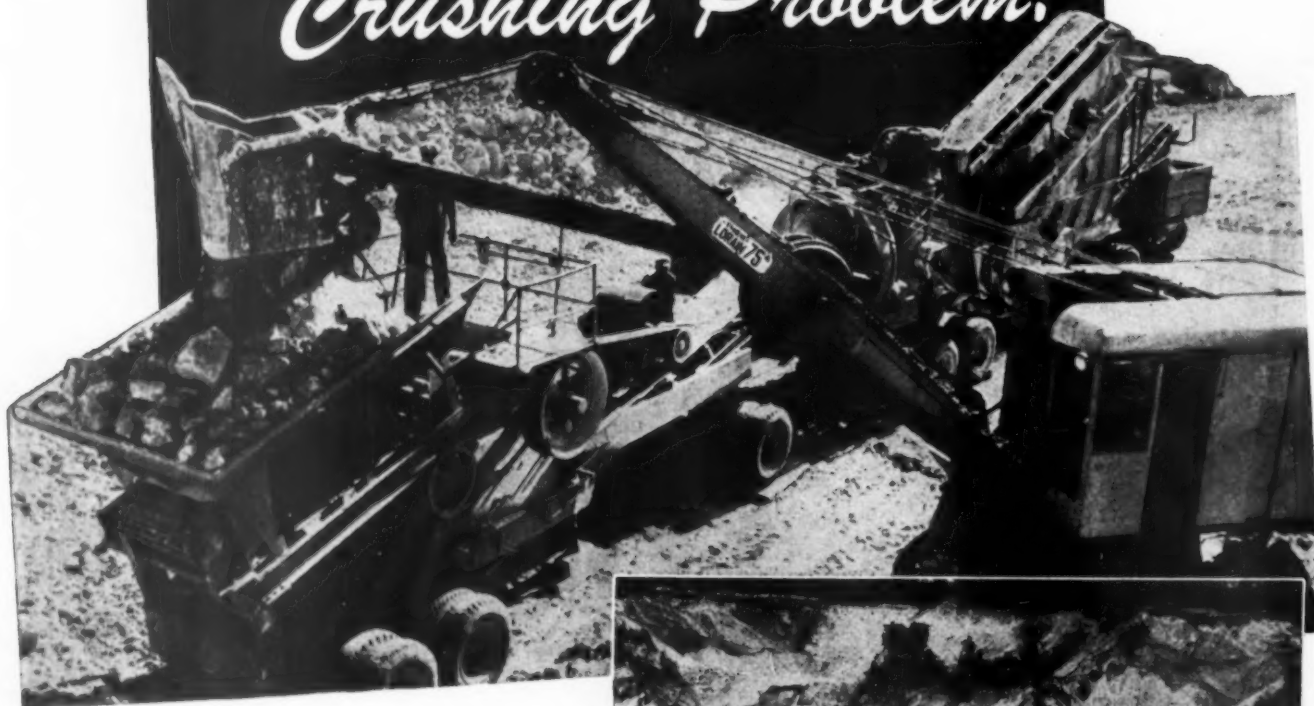


AMERICAN BOSCH

Diesel Fuel Injection

When writing advertisers please mention —> ROADS AND STREETS, June, 1946

SOLUTION *to your Crushing Problem!*

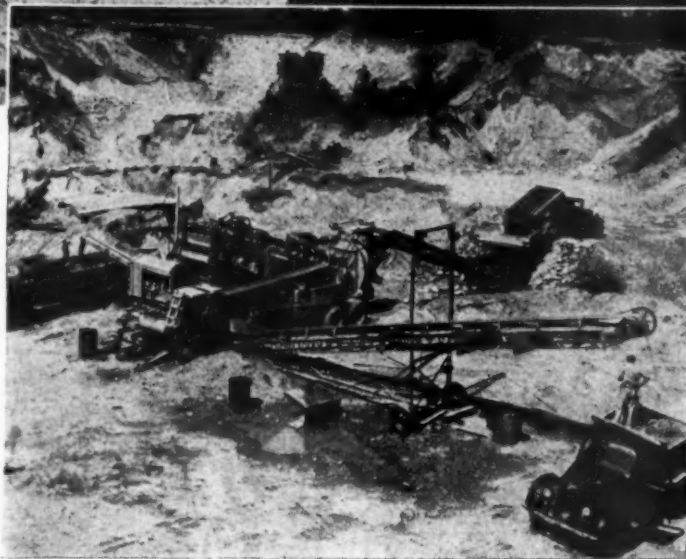


Whether your problem involves crushing, screening, or handling of rock or gravel, rugged profit-proved Universal equipment will solve it and provide highest output, at lowest cost for the most years.

Every Universal Plant — and every part of every Universal Plant — from charging hopper to delivery conveyor — is designed to turn out maximum capacities at lowest cost, and is built for a long service life, ease of operation and minimum maintenance. Whether you need an entire plant or just a crusher, feeder, screen, conveyor or any one of the parts that go to make up a gravel or quarry plant, it will pay you in the long run to consult your Universal dealer.

Two soundly engineered high-output Universal Plants are pictured. At the top is an 822-Q; the outstanding two unit, portable rock plant. It is shown turning out road rock for a Wisconsin contractor who operates a number of Universal plants.

At right is a Universal 880 Gravelmaster working in a pit near Stillwater, Maine. This single unit, complete gravel screening, crushing and loading plant is noted for its large capacity and extreme portability. Numerous owners are profiting from their use.



In a few minutes you can check Universal performance against the field. Send for literature.

UNIVERSAL ENGINEERING CORPORATION
631 C Avenue, West
Cedar Rapids, Iowa



WHAT ELSE?

*Mr. Buyer of
Steel Castings*



When you have the salesman's word that his steel foundry can more than meet your specifications for physical properties, finish, dimensional accuracy, and internal soundness, are you all set?

No. There is something else. Your \$64 question is, "What precautions or procedures does your foundry take to insure that every casting will ring the bell?"

Racine Steel Castings Co. long before the war was at the forefront in setting up foundry procedures for insuring as far as possible that every customer would get his castings as specified and required.

1 Before your pattern is prepared for production, it is examined by our engineers to determine if it will produce the casting you want most economically for you.

2 A test casting is poured and X-rayed under high power to check internal soundness. If weaknesses appear, foundry practice is changed to try to overcome them. If this can't do it, design changes are worked out with you.

3 A complete layout check for dimensional accuracy in all planes is given the test casting. If tolerances are exceeded, the casting goes back for revision of pouring practice or even again of design.

4 Your pattern is put into production only after test castings rate perfect. All the way through production, close control is maintained by laboratory and foundry technicians.

5 Before the shipping department gets your castings, they have run the gauntlet of an independent Inspection Department that gives them a thorough going over for surface and internal defects, straightness, and adherence to dimensions. No cripples pass.

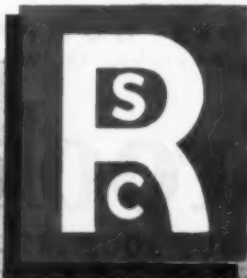
In short, it is one thing to set up specifications; it is another thing to know what your chances are of having every casting meet them. Buy your steel castings where that chance is closest to 100%.

RACINE STEEL CASTINGS CO.

DIVISION OF BELLE CITY MALLEABLE IRON CO.

RACINE, WISCONSIN

Racine Carbon and Alloy Steel Castings



Building a Highway.. Flight Strip..Airport?



**Get all the Hot
Material You Need —
Fast at Low Cost with
a Cleaver-Brooks
Portable Booster**

THE big opportunity to show how Cleaver-Brooks Portable Boosters make quick work of auxiliary airports, emergency landing fields and strips came when they were put to use in meeting vitally important "RUSH" war assignments.

Hundreds of these boosters were on the job heating the oils and bituminous materials as needed. Construction crews were not delayed . . . flight strips and airfields grew seemingly over night.



Write On Your Business Letterhead . . .
For the Bituminous — mix Calculator — a
ready reference slide rule showing weight
of mix needed in lbs. and tons in relation
to width and depth of area to be covered.

Cleaver-Brooks Boosters circulate and pump oils and bituminous materials while heating (approximately three times faster than is possible with steam) to a wide range of application temperatures as required on the job.

Bituminous boosters were pioneered by Cleaver-Brooks. They are in nation-wide use for airport and road construction and maintenance. They are without equal in speed and economy. Write for complete information.

CLEAVER-BROOKS COMPANY
329 East Keefe Avenue, Milwaukee 12, Wisconsin

Cleaver-Brooks

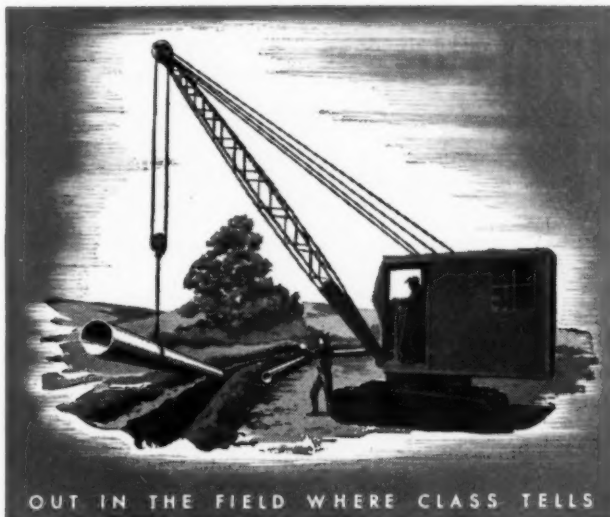
**TANK CAR HEATERS . . . BITUMINOUS BOOSTERS . . .
AUTOMATIC STEAM-PLANTS**

Sturdiness And Stamina In Chrysler Industrial Engines

RECORD*... With built-in precision and advanced engineering, Chrysler engines have demonstrated a sturdiness and stamina that meet the challenge of day-in, day-out gruelling use.

Chrysler designers and engineers introduced the compact, high compression engine—adapted it to various types of industrial uses—constantly improved it wherever possible.

Superfinishing of moving parts—originated by and exclusive with Chrysler—makes them practically



wear-proof—increases efficiency of the engine and insures long life.

The most modern and efficient manufacturing equipment is employed to attain built-in precision. Rigid inspection proves the quality of materials and accuracy of processing before final release for various industrial power applications.

Thus—sturdiness and stamina are in-built characteristics of Chrysler Industrial Engines, assuring users safe, dependable, efficient and economical power.

*One of the 8 character points in the Chrysler Industrial Engine Pedigree

Meet The Challenge of Gruelling Use

To meet the power demands of modern industry in various fields of application an industrial engine must be more than just a good engine.

It must have a reserve of power and stamina for the strenuous jobs and added hours of continuous operation. It must keep going under unfavorable conditions—out in the field where exposed to the elements.

Chrysler Industrial Engines are "Horsepower With a Pedigree." They possess inherent qualities that enable them to meet the challenge of gruelling use. They are

more than engines—they are units of "packaged" horsepower that can be depended on when the going is tough.

That's why they have been so successful in meeting the varied power requirements of tractors, shovels, cranes, pumps, air compressors, generator sets and other power applications in the construction industry.

Attention Dealers: Some desirable Chrysler Industrial Engine territories are available. Write to the Chrysler Industrial Engine Division for complete information.



Industrial Engine Division, Chrysler Corp.
12208 East Jefferson, Detroit 31, Michigan

Please send the Chrysler Industrial Engine Catalog.

Name

Address

City State

Give the Operator the "Breaks"

You put efficiency into the hands of the operator when you give him an easy-to-handle Bucyrus-Erie Bullgrader mounted on an International TracTracTor. He's not afraid to tackle the tough jobs because he knows that he has a real combination digging tool with all the strength and power that the tough jobs require. He prefers a Bucyrus-Erie Bullgrader because, all along the line, it gives him every "break" that means speedy performance:

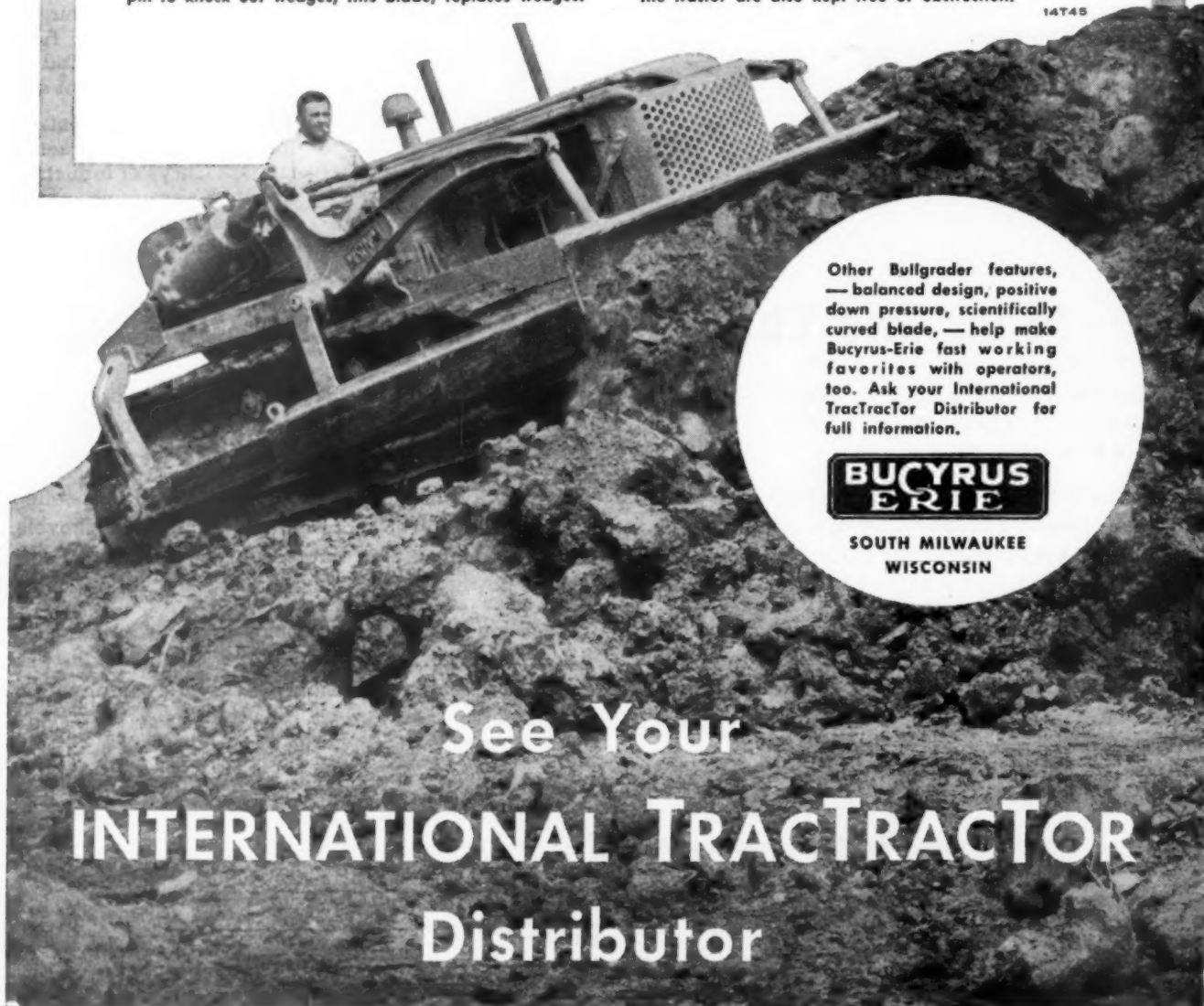
Unobstructed Vision — The operator sees exactly what the blade is doing from his position on the tractor seat. The hydraulic cylinders are mounted well back, out of his line of vision, and there are no superstructures around which he has to stretch his neck.

Handy Blade Adjustments — The operator can easily angle or tilt the blade in a few minutes without special tools. To angle, he removes landside pins, shifts the blade, replaces pins. To tilt, he uses landside pin to knock out wedges, tilts blade, replaces wedges.

Accurate Control — Giving him quickly responding positive up-and-down control of the blade, the Bucyrus-Erie hydraulic system keeps the operator completely in command of his job, lets him 'hold' the blade in position for smooth, even cuts. The conveniently-placed control lever is within easy reach.

Accessibility for Lubrication — The lubrication points on the blade equipment are easy to get at for regular preventive maintenance. Lubrication points on the tractor are also kept free of obstruction.

14T45



Other Bullgrader features, — balanced design, positive down pressure, scientifically curved blade, — help make Bucyrus-Erie fast working favorites with operators, too. Ask your International TracTracTor Distributor for full information.


**BUCYRUS
ERIE**

SOUTH MILWAUKEE
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See Your
INTERNATIONAL TRACTRACTOR
Distributor



**A Part of Better
Road Construction
for over 20 Years...
OHIO OIL COMPANY ASPHALTS**



The proof is in the performance. And for more than 20 years, Midwest contractors and public officials have found Ohio Oil Company asphalts unsurpassed for long-life, low-upkeep road construction. The Ohio Oil Company manufactures a complete line of all grades of rapid, medium and slow-curing asphalts and asphalt cements and Lincoln-ite (pulverized petroleum asphalt).

THE OHIO OIL COMPANY

ASPHALT DEPARTMENT

Robinson, Illinois • Lovell, Wyoming

Producers of Petroleum since 1887

DIETZ LANTERNS

Now Under Way



Please accept our gratitude for your patient cooperation during the days of war needs and consumer scarcity. We are getting under way for normal production.

NOW Terms
Coated
Steel

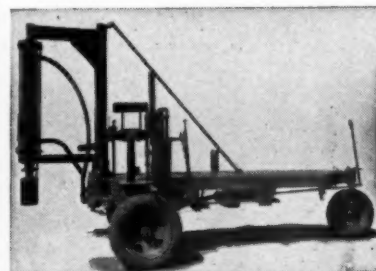


Finished in
Gray
Enamel

R.E. DIETZ COMPANY
1840 NEW YORK 1946

OUTPUT DISTRIBUTED THROUGH THE JOBBING TRADE EXCLUSIVELY

RAPID!



Cuts concrete and cuts labor costs to 2 1/2¢ per square yard. Applicable to floor work and different types of inside horizontal work.

Very efficient in maintenance work of highways.

Boom folds down and readily trailed by any light truck. Make your compressor treble its output by hooking it to this machine.

**Rapid Pavement
Breaker Co.**

1517 Santa Fe Ave.
Los Angeles 21, Calif.

Scrapers and Cableways

for Dig-and-Haul Jobs



Explanation of Picture—Here is a Sauerman Power Scraper of heavy duty type stripping muskeg overburden to uncover a gravel deposit in Alaska. After completing the stripping, this scraper kept right at work hauling the gravel to a portable crushing plant. Sauerman Scrapers are making money for thousands of owners who use this equipment for all kinds of long range material-handling jobs.

With a Sauerman Scraper or Cableway you can make easy work of many material handling projects that would be difficult and costly by any other method.

Digging, hauling and automatic dumping are merged into one operation controlled by one operator. Uower requirement is moderate. Maintenance is simple.

Standard Sauerman machines offer handling capacities from 10 to 600 cu. yd. per hour and operator. Power requirement is moderate. units are built to order.

Specifications of the various sizes and types of machines, with illustrations of their use, are given in the Sauerman catalog. Write for this literature today.

SAUERMAN BROS., Inc.

588 S. CLINTON ST., CHICAGO 7, ILLINOIS

Better
**WEED
CONTROL**
this Season
WITH 2-4D

Tested and approved by leading agricultural colleges.

Weedeath
TRADE MARK

The Perfected
**2-4D WEED KILLER
WILL DO THE JOB!**

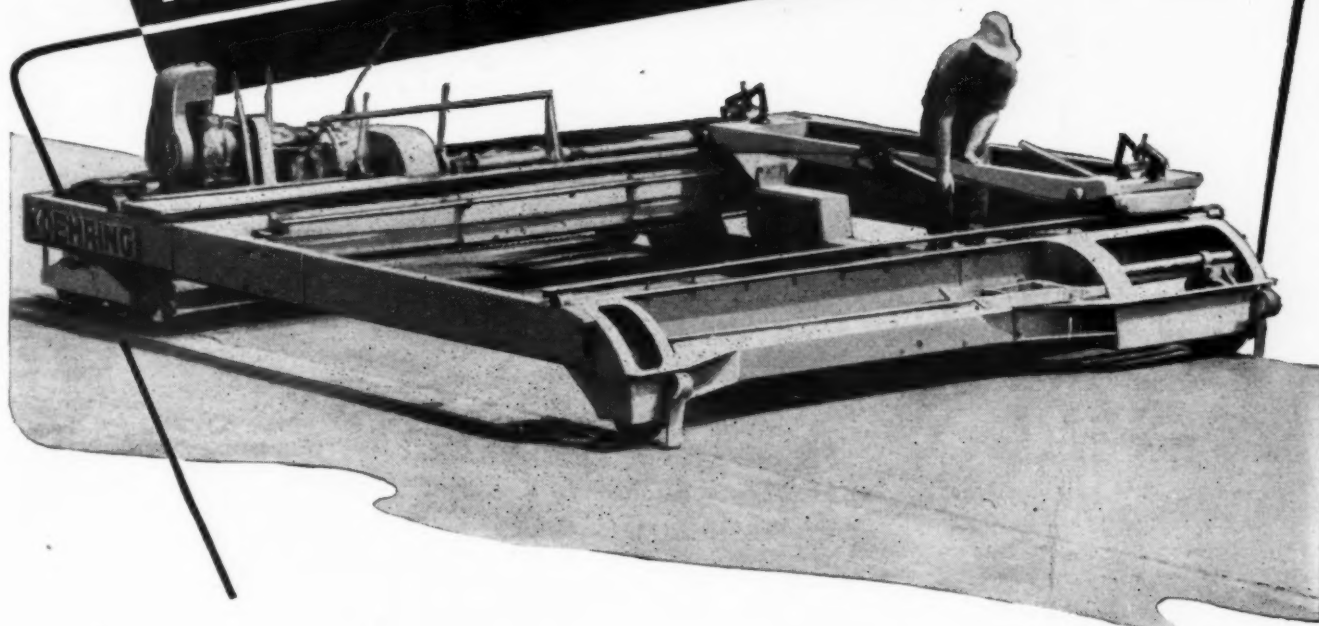
- COMPLETELY WATER SOLUBLE
- WILL NOT DETERIORATE

Packaged in 8-ounce, quarts, gallons, 5-gallon and 50-gallon containers

Write or wire dept. (5) now for quantity discounts

HOWARD HANSON & CO.
Agricultural Chemicals and Hormones
BELOIT, WISCONSIN

**CROWN CONTOURS WON'T FLATTEN OUT
IF YOU FINISH AT THE RIGHT TIME**



**FINISHING AT THE RIGHT TIME,
NO MATTER HOW STIFF THE
CONCRETE, IS EASY WITH THE
KOEHRING LONGITUDINAL FINISHER**

At the stage where concrete should be finished—after the concrete has almost completely subsided, when there is no longer any danger that crown contours will flatten out after finishing — concrete is often too stiff for finishing by hand tools.

But no matter how stiff, the concrete is workable for the 6,700 pound Koehring Longitudinal

Finisher. It's able to work where you want it to work — well back of the paver. Crown contours go on to stay, as specified, because once finished at the correct stage, concrete will not flatten out or slip.

KEEPS UP WITH ANY PAVER

Koehring Longitudinal Finisher offers other important advantages as well. First: It finishes fast, keeps right up with any paver. No need to hold back your paver while the finishing crew catches up. Second: Finishing labor costs are often substantially reduced. Third: Crowns are exact to specifications, mechanically perfect every time, from beginning to end of the shift.

KOEHRING COMPANY • Milwaukee 10, Wisconsin

HEAVY-DUTY CONSTRUCTION EQUIPMENT



WHAT'S YOUR JOB?

The Buckeye Line of Cost-Cutting Construction Equipment Will Help You Handle It With Greater Profit!

Material Spreading?

Buckeye Material Spreaders with spirally fluted feed rolls, spread evenly in measured quantities, from a trickle to a 6" base course. Handle all materials, wet, dry or sticky.

Dozing?

Buckeye Dozers and Trailbuilders have the "guts" for the big jobs—the balance and control for complete utilization of tractor's power. They dig in and move bigger loads with less effort.

Highway Widening?

Buckeye Highway Wideners cut smooth, clean trench of uniform width and depth true to grade, leaving subgrade ready to receive material. Cut trench from 12" to 48" wide and up to 12" deep (24" depth extra), fast and economically.

Trenching?

Buckeye Trenchers—digging wheel or boom types—a model for every trenching requirement—dig through any material short of solid rock. They have made cost cutting records on every major trenching job.

Road or Airport Construction?

Buckeye R-B Finegraders save time and money in preparing subgrade. One operation provides a smooth, properly crowned, accurate, compact subgrade ready for the paver. Finegraders work faster than paver—keep it going all the time.

Excavating? Material Handling?

Buckeye Clipper $\frac{1}{2}$ and $\frac{3}{4}$ Yard Convertible Power Shovel for efficient, low cost work. Exclusive "Mevac" Metered Vacuum Power Control gives operator "real feel," quicker response.

BUCKEYE TRACTION DITCHER CO.
FINDLAY, OHIO

Built by

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CONVERTIBLE SHOVELS—BULLDOZERS—ROAD WIDENERS
TRENCHERS—MATERIAL SPREADERS—R-B FINEGRADERS

THIS NEW IMPROVED SUPER LUBRICANT*

Resists Sludge Formation Removes Hard Carbon



IT'S
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D.H.D. OIL
FOR DIESEL AND HEAVY DUTY

- Stronger Protective Film
- Greater Penetrative and Adhesive Properties
- Non-Corrosive — Safe
- Adds Power, Saves Fuel, Saves Wear and Shut-down Time

**USE IT FOR TOUGHEST LUBRICATION JOBS
IN ALL INTERNAL COMBUSTION ENGINES**

***Accepted by Leading Engine Manufacturers as a Superior Lubricant**

Naturalube D.H.D. is basically different —superior to conventional type oils— because Nature itself has given D.H.D. these essential lubricating properties: (1) A naturally tougher film that has unusual ability to *penetrate* to all moving parts plus the ability to *adhere* to these parts even when engines are idle. (2) Natural solvent properties enable Naturalube D.H.D. to loosen and remove hard carbon from rings, pistons, valves and plugs. (3) D.H.D. is naturally non-corrosive—safe!

*For normal service where D. H. D. is not required,
use Naturalube Motor Oil (not so heavily reinforced.)*

In addition, Naturalube D.H.D. is specially reinforced to resist the formation of sludge and lacquer which often clog filters, screens and oil lines. When you use D.H.D. you save wear... engines are cleaner... rings and valves operate freely for longer periods... shut-down time is minimized, and maintenance costs are lower. For complete information about D.H.D., see your local Naturalube distributor or write direct to Lion Oil Company, El Dorado, Arkansas.

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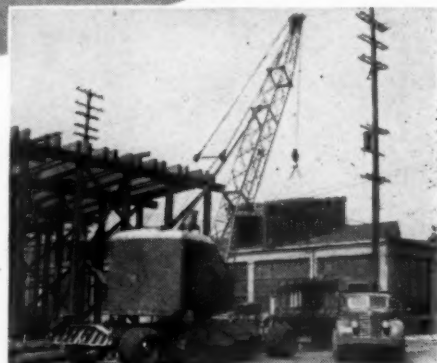
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**MORE BRIDGE per DOLLAR
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PRESSURE-CREOSOTED
WOOD**



View of Typical Deck Under Construction. Base is laminated treated plank with alternate pieces raised to form grooves. Metal shear plates and hold-down spikes integrate the treated wood base with the concrete top in which reinforcing steel (the quantity is reduced to a minimum) provides thermal reinforcing and distributes load to the wood.

This fine-looking Maryland bridge, built of pressure-creosoted wood, is a practical example of how you can stretch bridge dollars . . . and shrink maintenance dollars . . . in your highway program.

An engineer from the Maryland State Road Commission, which has built a number of similar structures, itemized the advantages as: (1) low cost, (2) permanent strength and rigidity, (3) maximum durability, (4) freedom from replace-

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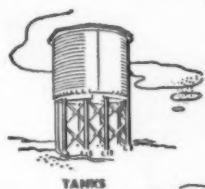
The use of pressure-creosoted piling gives long-time protection against decay, and—in salt water

installations—against marine borers. The composite-deck construction, illustrated in the small picture above, gives a superior traffic surface combined with high structural strength.

We will be glad to give you information about the service and saving possibilities of pressure-treated wood in bridge construction, if you will write. Wood Preserving Division, Koppers Company, Inc., Pittsburgh 19, Pa.

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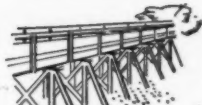
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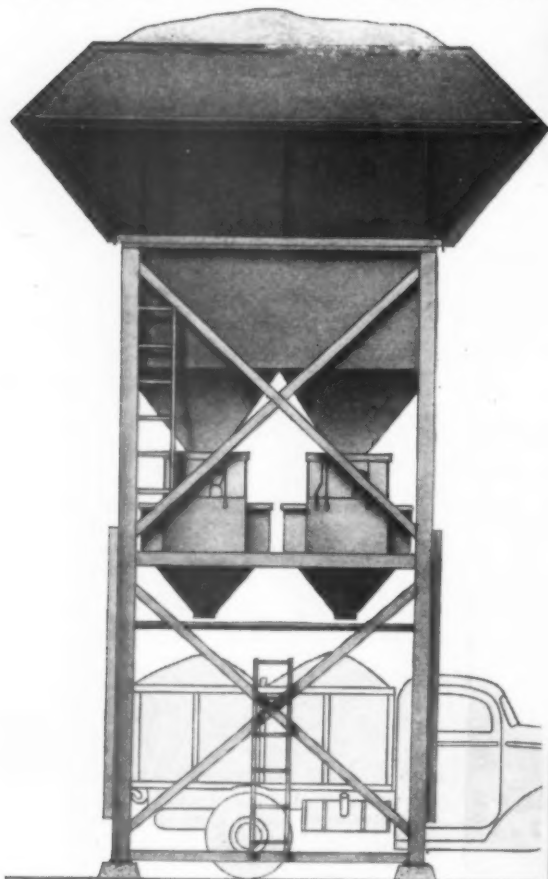
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With the new Johnson Dual Aggregate Batching Plant, you can now take full advantage of 1-stop loading of 2-batch trucks at both the aggregate and the bulk cement plant. Johnson Dual Aggregate Batching Plant discharges both batches into a 2-batch truck simultaneously. Extra "spot-stops" are eliminated. On most jobs, the number of hauling units can be reduced. 100 yard, 3 compartment portable section bin is equipped with 2 multiple material



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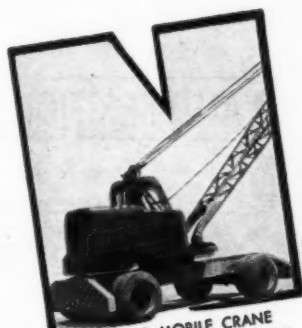
• The bucket leader is Wellman—pioneer in building buckets of welded rolled steel! Gives you longer, better service at lower cost on all types: Multiple Rope, Power Arm, Dragline, Power Wheel, Special Service— $\frac{3}{8}$ to $16\frac{1}{2}$ yd. capacity.

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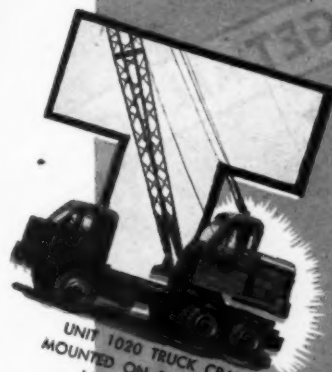
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UNIT 1020 TRUCK CRANE
MOUNTED ON 3 AXLE TRUCK
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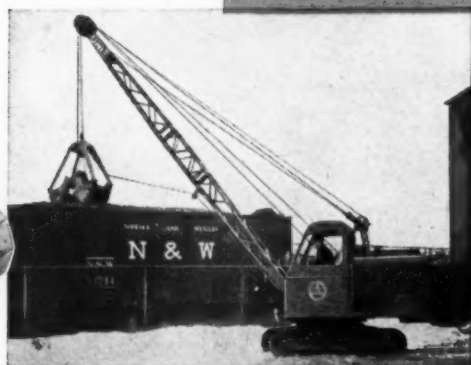
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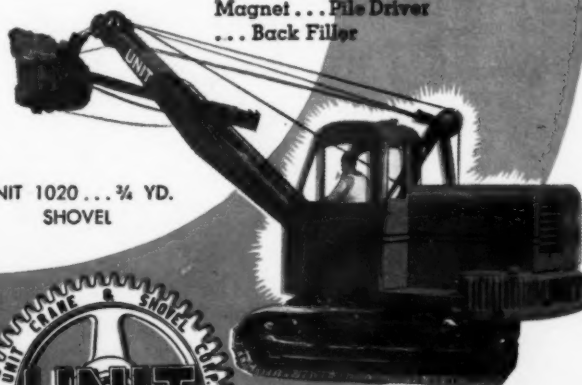
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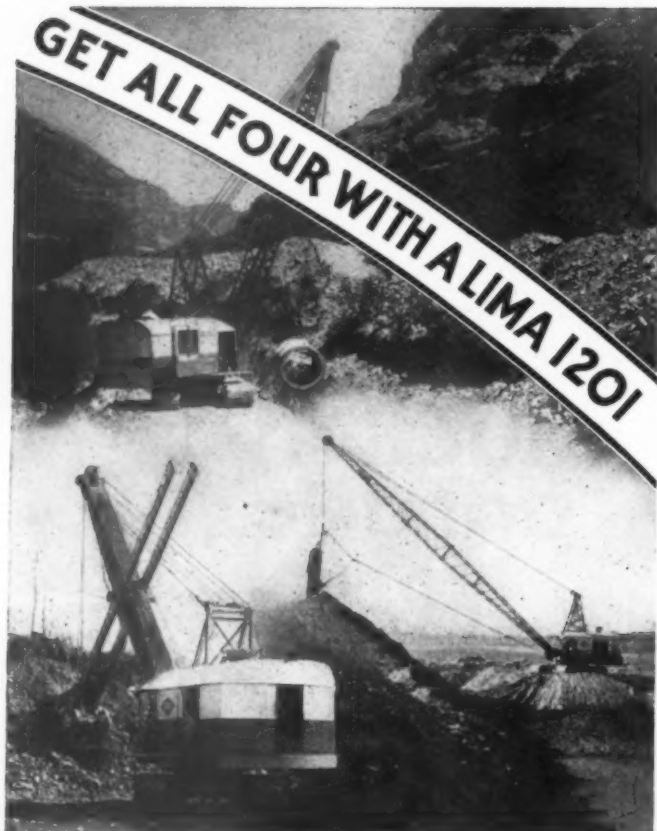
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3 BIG WIDE DRUMS . . .

4 "PRECISION" AIR CONTROL . .

The more
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the better the
PERFORMANCE

EASY TO
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The LIMA Type 1201 is designed, engineered and built for heavy duty construction—for the job that demands more than the ordinary. As a standard shovel it is equipped with a 3½ cubic yard dipper, 32' 6" boom and 22' 0" dipper handle. For high lift work a 42' 0" boom, 32' 0" dipper handle and 2½ cubic yard dipper can be furnished. As a crane it has a lifting capacity of 65 tons. Dragline capacities vary, depending upon the nature of the work. Whatever the job, whether it be tough rock digging, working as a dragline, in wet swampy ground or crane work where heavy lifts must be made with utmost precision, you'll find that the LIMA Type 1201 will fit into your plans exactly. Every day, more and more users of excavating machinery are turning to LIMA for the most in excavator design.

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SHOVELS ¾ YARD TO 5 YARDS

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VICKERS Hydraulic Power Steering

Vickers Hydraulic Power Steering requires minimum space and can be located where it does not interfere with other apparatus. In nearly all cases it is easily applied to existing vehicle design with only a few simple alterations.

The hydraulic power cylinder is connected to the drag link at one end and the chassis frame at the other; it is controlled by the pitman arm. The existing steering gear is not altered. Hence, Vickers Power Hydraulic Steering is easily applied either as original or as optional equipment.

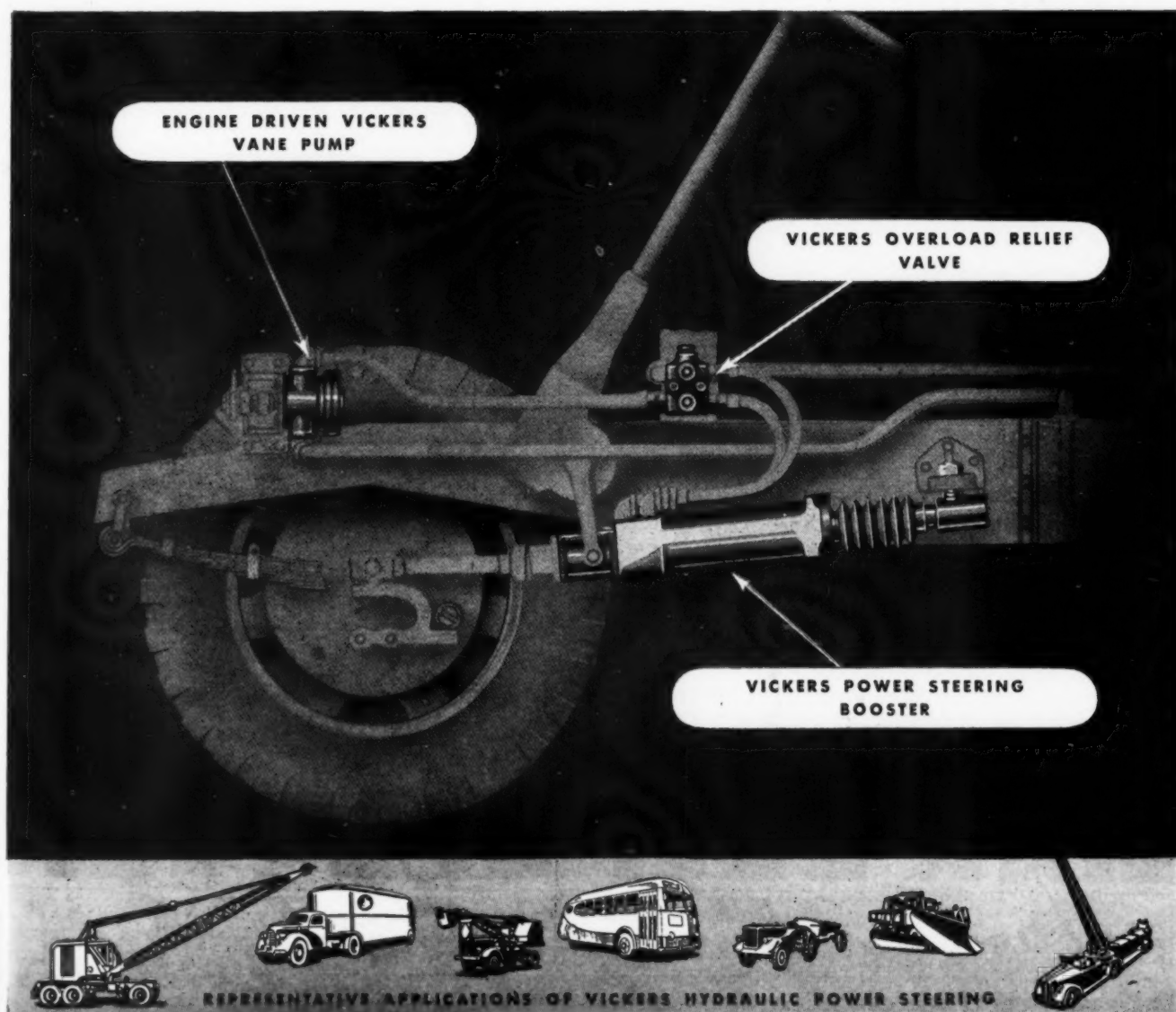
Steering is finger-tip easy—instantly responsive—and no road shocks can get to the steering wheel. Overload

protection and lubrication are both automatic. Fifteen years of successful operation on trucks, buses, and road machines have proved the value of Vickers Power Hydraulic Steering. Write for Bulletin 44-30.

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Speed-O-Matic

EFFORT-LESS CONTROL

- ★ MAINTAINS TOP EFFICIENCY
- ★ SPEEDS UP THE JOB
- ★ INCREASES OUTPUT
- ★ REDUCES COSTS

AS EASY AS DRIVING A CAR

Link-Belt Speed-O-Matic Control means operator control and action from a single-lever console. The operator is comfortably seated at full view of the work. Operation is as simple and easy as driving an automobile.

POWER CONTROL vs. MANUAL OPERATION

Speed-O-Matic Control does two things: it introduces operator fatigue and increases the operating speed of the machine. The introduction of these two advantages immediately increases the output of the machine and introduces a new era in machine design.

DELEGATES BACK-BREAKING LEVERS TO THE HORSE AND WAGON DAYS

The older type of control used a series of levers, each with its own function. The operator had to move his hands from one lever to another, and the machine would stop each time. This was a slow and inefficient method of operation. Link-Belt Speed-O-Matic Control is a single-lever control. The operator can operate the machine with one hand, and the machine will stop only when the operator releases the lever. This is a much more efficient method of operation.

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ANOTHER LINK-BELT ACHIEVEMENT

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AMAZING RESULTS ASSURED

Speed-O-Matic Control results in a gain in production, less wear and tear on machine parts, and a reduction in operator fatigue. A visual inspection is necessary to see the results of the amazing results that are now yours.

PROVED IN THE FIELD

Link-Belt Speed-O-Matic Control is a proven fact. It has been used in the field for many years, and its results are well known. It has been used in the construction of roads, bridges, and other large-scale projects. It has been used in the mining industry, and in the production of steel. It has been used in the production of cement, and in the production of other materials. It has been used in the production of many other materials, and its results are well known.

This bulletin announcing Speed-O-Matic Hydraulic Control was first published in 1936, 10 years ago.



Speed-O-Matic

TOPS ALL BETS!

PERFORMANCE BEATS CLAIMS MADE 10 YEARS AGO

Speed-O-Matic Hydraulic Control on Link-Belt Speeder "shovel-cranes" has passed its first 10-year milestone . . . ahead of schedule!

. . . 10 years ago we believed this development would mark a new era in power shovel design; that it would assure greatly increased output; and abolish "operator fatigue."

. . . Today our expectations have been exceeded by results. Reports from every part of the country show increased outputs of 25% or more regularly.

Replacing human muscle with positive hy-

draulic pressure eliminates lost motion in operating clutches and brakes, saving minutes in every hour; reduces wear and tear on machine parts, and by eliminating effort and fatigue, enables the operator to deliver capacity yardage right up to the last minute of the shift.

Speed-O-Matic demonstrates Link-Belt Speeder's leadership in engineering and building shovels, cranes, draglines which will do more work, more kinds of work, more of the time!

For Prompt, Efficient, Convenient Sales and Service:
There is a Link-Belt Speeder Distributor Located Near You

LINK-BELT SPEEDER



Builders of the Most Complete Line of

SHOVELS-CRANES-DAGLINES

LINK-BELT SPEEDER CORPORATION, 301 W. PERSHING ROAD, CHICAGO-9, ILL.
(A DIVISION OF LINK-BELT COMPANY)

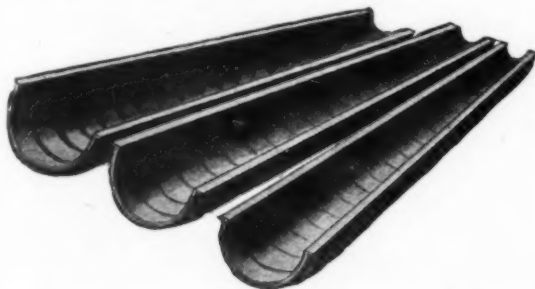


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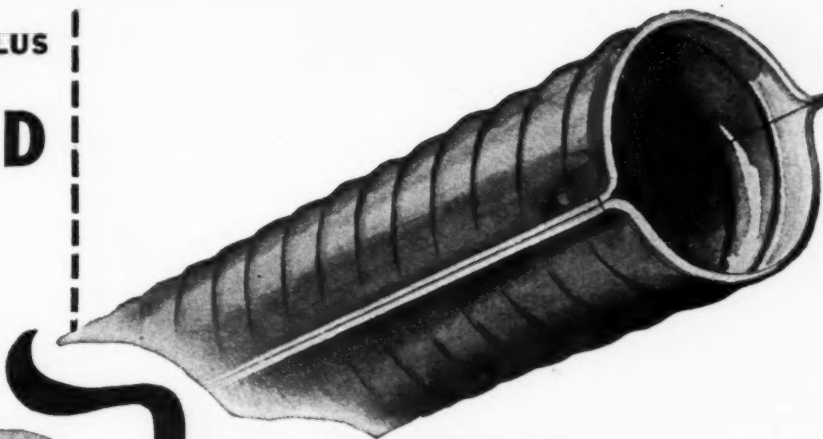


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HALF SECTIONS...
NESTED... FLANGED TYPE
FOR BOLTING**



12".....	.42 per ft.	36".....	1.53 per ft.
18".....	.45 per ft.	48".....	2.04 per ft.
24".....	.75 per ft.	60".....	2.93 per ft.
30".....	.93 per ft.	72".....	3.59 per ft.

VETERANS OF WORLD WAR II: This surplus property is offered to priority claimants including Veterans of World War II. To help you in purchasing surplus property, a Veterans' Unit has been established in each of our Regional Offices.



Now AVAILABLE

Here is real opportunity to get a quantity of high quality culvert pipe without delay—for surface water disposal. Each section of pipe is fabricated in half sections, flanged and nested for ease of handling and shipping. When in use, the top half is fitted to the bottom half and bolted tight. All sizes from 12 inches to 72 inches in diameter. Over a million and a half dollars worth of this surplus piping is available and stored at War Assets Administration Regional Offices throughout the country. Check the price and size listing at left, then phone your order to your nearest War Assets Administration Regional Office listed below... or if you wish, clip the coupon—indicate sizes and quantity wanted—and *mail right now*.

This surplus property subject to prior sale.

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Everything a contractor could ask for in a power shovel — to make short work of every contract — is built into the modern MARION to make it today's soundest investment in top yardage. It is fast powerful full of action in every movement versatile easy to operate sturdily constructed for rugged service and incorporated with the latest engineering features that years of experience have proven as practical. These are the things you get when you buy a MARION.

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Offices and Warehouses in all Principal Cities
from $\frac{3}{4}$ cu. yd. to 40 cu. yds.

Note: Marion Power Shovel Company — Formerly The
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SPINNING WHEELS

...keep the odds
against you!



You lose

- in traction
- in power
- in tire wear
- in road damage
- in payload
- in delays



WALTER 4-POINT POSITIVE DRIVE *Stops wheel spinning!*

In conventional two and four wheel drive trucks, the wheel that *slips* gets the power—then wastes it spinning and churning its way deeper into the mud.

In contrast, the Walter Four-Point Positive Drive automatically *stops* sending power where it *cannot* be used and puts it where it *can* be used—in the wheels that *have* traction. This is done by three automatic locking differentials. They arrest wheel spinning by proportioning the power to the **FOUR** driving wheels according to their traction at any instant.

That is why Walter Tractor Trucks haul in bad weather when other trucks are stopped or stalled—why they haul enormous loads through soft dirt, deep mud, up steep grades and over slippery surfaces. That's why they do not grind tires or gouge roads. That's why they carry bigger payloads in open pit mining, strip mining and off-the-road hauling, faster than any other truck. Get the complete story about these unique trucks, today. They can save money on *your* jobs, too.



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Make a higher percentage of profit from construction and excavating jobs of all types with fully convertible MICHIGAN Air Controlled Mobile CRANES — available in 6 to 12 ton capacities.

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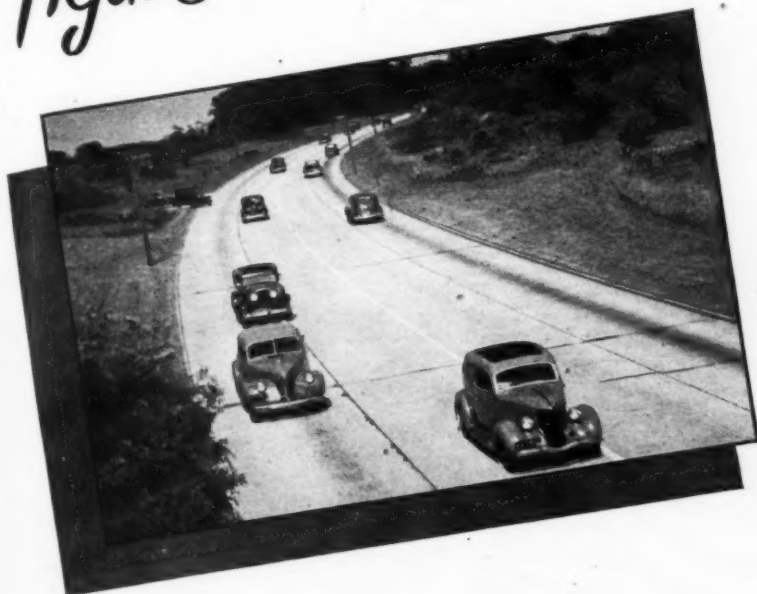
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Figure it in man hours...



- and you'll choose...

Put it to the *man-hour test*—and 2-4 Dow Weed Killer will be your choice to kill your weeds . . . easily . . . completely . . . *chemically!* With 2-4 Dow Weed Killer, one man can eliminate weeds in a few hours from an area it would take many times as long for a crew to cover with old-fashioned hand digging and hoeing methods. Just spray the tops—you've killed the weeds.

That means lower maintenance costs! And 2-4 Dow Weed Killer won't kill common grasses when used according to directions. It won't clog your sprayer, either, and it's safe to handle.

If you want to get rid of *grasses and weeds*, use Dow Contact Herbicide. This new vegetation control agent kills top growth—especially valuable wherever mowing is impractical.

Check These 2-4 Dow Advantages:

- ✓ Harmless to ordinary grasses
- ✓ Easier and safer to handle
- ✓ Noncorrosive to spraying equipment

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2-4 Dow
*Weed
Killer*



**Its
BITE
cuts
costs!**

*Patterned by Sure-Grip Earth Movers working on
New York's \$200,000,000 Idlewild Airport job.*

HERE you see the tread marks of a work champion — Goodyear's Sure-Grip Earth Mover. It hauls big yard-ages faster — delivers lower costs on big jobs everywhere. That's because its *open center* self-cleaning tread keeps those husky lug bars *completely separate* — enables *each* one to bite in sharp, clean, deep — take a full-depth, full-length grip with minimum slip — pull sure and steady in *any* going. That's the big reason why Goodyear's Sure-Grip is tops with cost-wise contractors everywhere — and one reason why "*more yards are moved on Goodyear off-the-road tires than on any other kind.*"

Sure-Grip—T.M. The Goodyear Tire & Rubber Company

**BUY and SPECIFY
GOOD YEAR
—it pays!**

GOOD YEAR

THE GREATEST NAME IN RUBBER

Battling Wet Soil

at Dubuque Airport

McVaugh-Haynes of Detroit and Alaska Highway fame nearing finish of 3,500,000 cu. yd. 2-year clay excavation job which has required summer-long discing of both cuts and fills

Harold J. McKeever
Editor, ROADS AND STREETS

G RADING the Dubuque airport has been one of those sweet running jobs that contractors like.

McVaugh-Haynes of Detroit, who bid this project in March, 1944, and began work July 3 that year, were able to work only 55 days in 1944 and 105 days all through 1945 because of weather. During this time they were often as much as 30% short of labor.

And on top of this, the clay soil showed such moisture holding ability

that cuts as well as fills have had to be disc'd constantly—even in mid-summer when haul roads were so dusty that sprinklers were out all the time. The contract called for about 3,500,000 cu. yd. of earth, bid at 24.8 cents, and about 127,500 cu. yd. of rock, at \$1.25. Fills up to 55 ft. and cuts to 37 ft. in depth are involved on this airport, which will have two runways and taxiways in a triangular layout. It is the largest earth moving job ever tackled in Iowa.

At the time of this reporter's visit in mid-April, 1946, the job was 70%

completed and the contractor was working all available equipment two 10-hour shifts in an effort to get done within an extended time limit. Much of the short haul material was moved first. Due to the fact that the greatest shortage of operators was on the Super "C" Tournapulls, much of the short haul dirt has been completed while there is still a million yards of dirt to be hauled 3,000 ft. (rather than a mile). The longest haul on the job was 4,200 ft. and all except 30,000 yd. of that has been hauled.

The contractor began this spring with sixteen 18-yd. tractor-drawn



★ Haul roads nearly a mile long across slow-drying clay added to the problem. A bulldozer aided blading operations



scrapers, ten 12-yd. Super C Tournapulls—about the same outfit as in 1944 and 1945—and an assortment of rollers and discs. One two-drum sheep-foot unit was drawn by a farm tractor and 4 others by a heavy tractor. The tractor-scraper units were working an area requiring comparatively short haul, while the self-powered units were hauling 4500 to 5000 ft., concentrating on the heaviest remaining fill at the extreme end of one runway. One medium tractor was discing

across the loading path of the later machines, while another tractor gave snatch service. The eight scrapers in service working on a typical April day averaged a load every 12 to 15 minutes (40 loads each per ten hours), in spite of green trainee operators and a very rough haul road, which had gotten away from the single grader and the single bulldozer available to keep the bumps and ruts ironed out.

About 14,000 cu. yd. per day was

★ Discing of cuts as well as fills was necessary in all seasons. This outfit is just starting on a cut, working across the scraper loading path

being tallied by the two types of scraper outfits, as compared with an average of 20,000 cu. yd. moved on good days last year when the haul was shorter. This job was originally set up for a 22,000 yd. average daily pace.

Up to 30% Moisture

The soil conditions encountered at the Dubuque airport, and elsewhere locally, are best explained by the fact that this region was once the bed of an ancient shallow sea. Blue and yellow clay deposits and pockets of black mucky soil lie interspersed along with a better granular soil. As a consequence a mixture of soils ranging from A-4 to A-7 would generally be taken up in an average scraper pass. During the first year when the cuts were first opened up, pockets of dark wet clays were encountered all over the place. This spongy, doughy soil had a high shrinkage, but tests showed that the various soils would result in a satisfactory fill when intermixed and compacted at approximately 20% moisture content.

To show the problem facing the contractor in getting the 90% modified proctor density required, moisture during the 1944 beginning (first million yards) averaged over 25% moisture content in 1944 and 30% in 1945. An area of about 200,000 cu. yd. of A-4 soil was pocketed within impervious clays that held as high as 62% moisture. Pockets were about 1,500 cu. yd. each and they had to be draglined out into piles to dry. Also about 1½ million yards of grey clays in all have been moved averaging 32% moisture.

When McVaugh-Haynes first began they "opened up all over," getting exceptionally large rolling areas as



★ Gasoline light plants were kept under roof

From Alcan to Iowa

McVaugh-Haynes was one of the construction contractors on the Dowell-managed section of the Alaska Highway. Their equipment built a section of road near Watson Lake and also the Watson Lake airport and the access road to it. Some of the very same scrapers and other units, overhauled and repainted, have since been slugging it out on the Dubuque Airfield. Just another contractor whose plea is, "give us more new equipment."



Repairing a Scraper Pan

★ The veteran scrapers in the McVaugh-Haynes outfit naturally needed some welding work here and there. The bottom of this unit had become so worn that a job of building up with entirely new metal was necessary. Old steel was cut away and new plate welded in as shown. The worn bar was also cut away and straps welded to make 'er good as new

well as cut areas, and working as high as five disc outfits and 10 to 12 sheepsfoot units (the latter with 4-ft. oil-weighted drums). Bleeder lines of clay pipe were installed along a creek channel through the center of the field. Better soils were encountered as months passed, and the water table was reduced by drainage and the elimination of high ground, resulting in somewhat lower but still excessive moisture readings. Fortunately this past spring the ground moisture above the frost line was not far above 20% to a depth of frost penetration of last winter. A criterion of the progressively better conditions is the lessening of shrinkage in the rolled fill.

Sink holes are an interesting occurrence on this project, occurring in connection with uncovered limestone ledges which involve about 127,500 cu. yd. of rock removal. The limestone while hard is quick weathering and leaches away readily in the presence of water seepage.

Uncovering of this rock apparently

allowed surface water to seep into subterranean cavities in rock fissures, which resulted in sudden settlement with sink holes "large enough to lose a tractor." The condition was caused

by pockets of A-4 soil. Sink holes also occurred on the site prior to beginning. Engineers on the job are discussing the possible need for finding and cementing such fissures to



★ The "McVaugh" and the "Haynes" of McVaugh-Haynes, contractors. At right are Harry Bender, Myron H. Price and James H. Scott of CAA

★ The contractor shooed the cows out of a barn to get space for a field shop. Each side bay of the barn was made into a two-story stock room, while the center area with its high door proved ideal for tractor overhauling. A three-bay building glimpsed at the right was also used for repairs on heavy equipment





★ Two high-pressure greasing outfits were installed in skid-mounted wooden houses rather than on trucks, and the contractor found it expedient for all heavy equipment to come by a central location for greasing and refueling

forestall trouble after runways are built.

Equipment Modified in Field

McVaugh-Haynes are widely experienced contractors who have a bent for working out mechanical innovations on their machines. While manufacturers aren't always in accord with their ideas, they have watched this outfit with interest and several experimental machines were put on the job for a while.

For example, the contractor did

away with the original electrical system on their self-powered scrapers and installed tractor generators for powering lights. The goosenecks on all self-powered scrapers owned were strengthened, as an additional safety factor, by welding ½-in. side plates. On some of the scrapers, as another illustration, the cable was re-routed from where it came off the spool, to keep it inside and clear of the push tractor. These experiments with equipment go on everywhere all the time, and it is partly from such doin's

of course that earth moving equipment has progressed.

The Dubuque Municipal Airport is a Civil Aeronautics Administration project under the CAA's Kansas City office, Harry Bender, superintendent of plants and structures branch, James H. Scott, chief of construction. Myron H. Price is resident engineer. Phil Paine is engineer for McVaugh-Haynes. Thompson Construction Co. of Indianapolis is subcontractor on drainage and A. Lindberg & Sons of Ishpeming, Mich., on rock excavation.

Lake Drained to Build Cut-Off

Mile-long dike roadway eliminates kink in Southern State Parkway on Long Island

A BUSY Long Island state parkway is currently being relocated directly across a large artificial lake, via a dike constructed of sand from the shallow lake bottom. The project is at Hempstead, L. I., where the

Southern state Parkway heretofore has circled the shore. The job involves draining the lake, moving about half-million cubic yards of material, and allowing the lake to refill and continue its function as a reservoir serv-

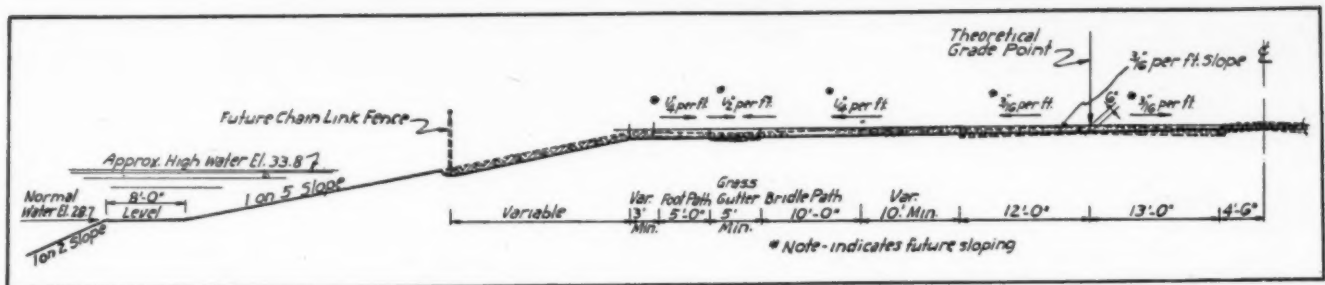
ing the New York City water system.

Andrew Weston of Woodmere, L. I., is the contractor. The first step was to drop the level of the lake about 10 ft., this operation requiring great care. The level was lowered only about 3 in. daily, to give time for the exposed shore line to dry out sufficiently to obviate slides. The water table was further lowered below the bottom of the lake by draglining the drainage ditches across the bottom.

The dike as shown in the accompanying sketches is an ordinary sand-filled embankment given a 5 to 1



★ Looking across the drained lake during preliminary grading operations for the dike. The white piled material is sand from drainage ditches cut across the lake bottom to lower the water table



★ Typical cross section through dike

slope above the lake level and flatter slope under water.

Large borrow areas on either side were excavated down 3 to 4 ft. In planning use of sand from the lake bottom it was first thought that mud accumulation might interfere. But only a thin layer of muck had been deposited during the life of this artificial body of water, and it was easily peeled away. The sand is typical of material underlying this area of Long Island.

The operation of deepening the bottom increased rather than diminished the usefulness of the lake by increasing its reservoir capacity. One large concrete drainageway will join the two sides of the lake. A combination of tractor-drawn and self-powered scrapers furnished by Hendrickson Bros. made short work of the 470,000 cu. yd. of unclassified, for which the bid incidentally was 42 cents a cu. yd.

The old location around the lake dates from 1926. The new location will make a much shorter and safer route.

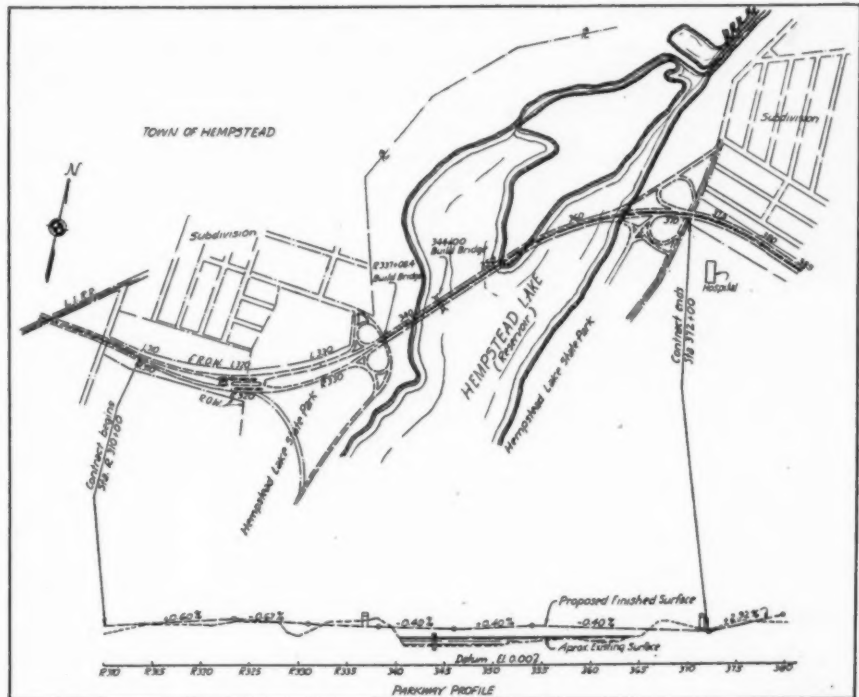
This project is under the Babylon district of the New York state department of Public Works and is part of the parkway program of the Long Island State Park Commission.

★ Digging for footings for a grade separation at one end of the cut-off project

16% Increase in Gas Consumption in 1945

Motor vehicles operated on the nation's highways during 1945 consumed approximately 19 billion gallons of gasoline, an increase of about 16 per cent over the motor fuel consumption in 1944, according to figures compiled by the Public Roads Administration from gasoline tax collection records submitted by state agencies.

The report shows a total of 19,339,492,000 gal. of motor fuel consumed in 1945, as compared with a total of 16,610,651,000 in the preceding year. The increase reflected the removal of gasoline rationing and other wartime



★ Plan of the lake cut-off



restrictions on travel after the cessation of hostilities with Japan.

The greatest increase in gasoline consumption, based upon the number of gallons taxed, was reported by New Mexico, with 32.8 per cent more

gallons used in 1945 than in 1944. The lowest percentage increase, 11.2, was reported by North Dakota. Evasion of the tax on road-used gasoline appears to account for the small increase in North Dakota.

Step by Step

Replacing an Old Covered Bridge with Steel Truss



1 The old covered bridge—picturesque inspiration to Ohio painters and poets but declared unsafe for modern traffic

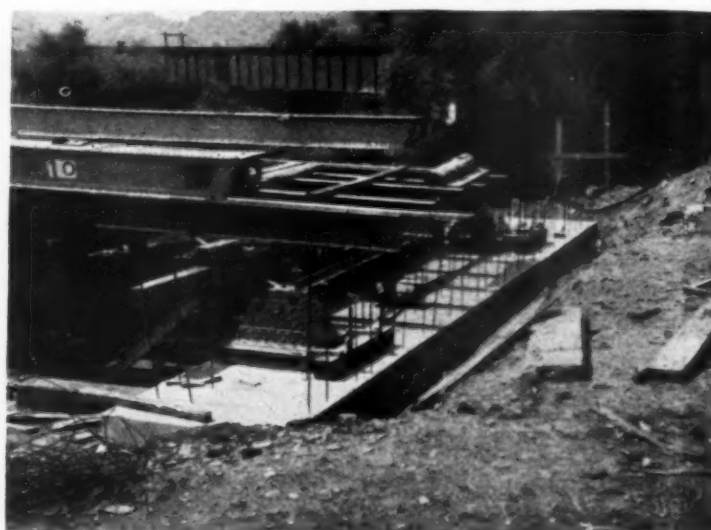
Baker & Hickey were the contractors on this Bridge replacement job, completed in Athens County, Ohio, during the later part of the war period. This was an emergency project, in which the Ohio department of highways was "Johnny

on the spot" with a salvage truss which had been marked, dismantled and stored for just such urgent use.

Photos courtesy Fred Swineford and staff, Ohio department's bureau of construction.



2 Falsework in place; set by the pile driver crane



3 Details of new pier and bearings, before concreting backwall

4 Up she comes! The old bridge doesn't look so good does it? One of numerous war-time bridge replacements found necessary in Ohio



5 The completed job. Ohio and other states still have many obsolete bridges that must be widened, strengthened or replaced soon



Second Postwar F.A. Apportionment Made

Total Federal-Aid Apportionment as of July 1, 1947—\$1,000,000,000

(From ARBA News Bulletin)

The second installment of the 1½ billion dollar fund authorized by the Federal-aid Highway Act of 1944 has been apportioned to the states and will be available on July 1, 1946, according to an announcement by Major General Philip B. Fleming, Federal Works Administrator.

Status of the Highway Program Federal Aid Contracts Awarded

Contracts awarded on Federal-aid work by state highway departments during April—392—Cost, \$55,932,506.

Contracts awarded first four months 1946—805—Total cost, \$127,735,581.

Contracts pending April 30—78—Cost, \$14,729,085.

Bids Rejected

Bids rejected by state highway departments on Federal-aid work since January 1, 1946—201—Reason: High bidding and other reasons.

Bids rejected by P.R.A. same period—36—Reason: High bidding.

Total Contracts Awarded

Total contracts awarded on Federal-aid—state and local highway construction first four months 1946—2,299—Cost, \$173,037,391—mileage, 10,217.

Estimated Highway Program

Total highway construction—1946\$ 550,000,000

Total highway construction—1947 1,000,000,000

Federal Aid Highway Act of 1944

(Chronology)

December 20, 1944—\$1,500,000,000 Federal Highway bill signed by President.

October, 1945—First \$500,000,000 made available and apportioned to states. Available until June 30, 1947.

May 16, 1946—Second \$500,000,000 apportioned to states. Available July 1, 1946 to June 30, 1948.

July 1, 1947—Third \$500,000,000 available until June 30, 1949.

Apportionment of Federal-aid Highway, Secondary and Urban Funds as of July 1, 1946 (\$1,000,000,000)

State	Highway (\$450,000,000)	Secondary (\$300,000,000)	Urban (\$250,000,000)	Total
Alabama	\$ 9,445,070	\$ 7,478,582	\$ 2,606,576	\$19,530,228
Arizona	6,480,578	4,481,932	524,336	11,486,846
Arkansas	7,737,576	6,225,492	1,116,442	15,079,510
California	18,035,038	10,322,890	16,244,466	44,602,394
Colorado	8,066,936	5,428,542	1,867,294	15,362,772
Connecticut	2,790,094	1,531,960	5,214,990	9,537,044
Delaware	2,193,750	1,462,500	408,114	4,064,364
Florida	6,472,162	4,335,450	3,199,282	14,006,894
Georgia	11,289,366	8,615,732	3,284,016	23,189,114
Idaho	5,596,778	3,913,402	423,598	9,933,778
Illinois	17,666,610	9,504,984	19,021,392	46,192,986
Indiana	10,806,804	7,246,114	6,131,468	24,184,386
Iowa	11,108,634	7,942,206	3,184,214	22,235,054
Kansas	11,292,644	7,927,698	2,214,438	21,434,680
Kentucky	8,426,994	6,824,160	2,599,058	17,850,212
Louisiana	6,789,998	5,080,696	3,063,156	14,937,850
Maine	3,897,688	2,807,884	1,121,076	7,826,648
Maryland	3,672,300	2,347,964	3,580,162	9,600,426
Massachusetts	5,885,212	1,572,910	13,225,230	20,683,352
Michigan	13,667,188	8,266,862	11,364,866	33,298,916
Minnesota	12,087,794	8,327,046	4,412,304	24,827,144
Mississippi	8,083,828	6,668,854	1,200,230	15,952,912
Missouri	13,328,154	9,130,222	6,302,316	28,760,692
Montana	9,087,414	6,208,850	615,330	15,911,594
Nebraska	8,940,054	6,310,326	1,565,552	16,815,932
Nevada	5,737,298	3,844,538	121,226	9,703,062
New Hampshire	2,193,750	1,462,500	950,000	4,606,250
New Jersey	5,728,620	2,083,262	11,055,974	18,867,856
New Mexico	7,288,584	5,044,972	514,522	12,848,078
New York	21,669,516	8,544,588	37,552,144	67,766,248
North Carolina	10,863,434	8,905,420	2,984,950	22,753,804
North Dakota	6,683,568	4,816,186	429,156	11,928,910
Ohio	15,786,510	9,300,068	15,079,148	40,165,726
Oklahoma	10,128,576	7,439,380	2,696,328	20,264,284
Oregon	7,456,806	5,088,490	1,621,746	14,167,042
Pennsylvania	18,365,592	10,537,126	21,034,402	49,937,120
Rhode Island	2,193,750	1,462,500	2,246,098	5,902,348
South Carolina	6,112,438	5,043,900	1,308,064	12,464,402
South Dakota	7,064,612	5,027,772	444,232	12,536,616
Tennessee	9,544,006	7,340,970	3,186,074	20,071,048
Texas	28,527,954	20,094,198	8,928,136	57,550,288
Utah	5,071,906	3,377,738	867,462	9,317,106
Vermont	2,193,750	1,462,500	423,768	4,080,018
Virginia	8,225,348	6,380,820	2,982,544	17,588,712
Washington	7,067,386	4,785,388	2,934,858	14,787,632
West Virginia	4,946,428	4,159,532	1,615,384	10,721,344
Wisconsin	10,861,356	7,356,652	5,308,936	23,526,944
Wyoming	5,588,484	3,792,314	266,098	9,646,896
District of Columbia	2,193,750	1,462,500	2,292,954	5,949,204
Hawaii	2,193,750	1,462,500	786,832	4,443,082
Puerto Rico	2,214,266	2,260,928	1,669,058	6,144,252

Minnesota Highway Traffic Near Prewar Volume

Traffic on Minnesota trunk highways in April averaged 92.7 per cent of the traffic volume in the same month in 1941, according to data collected at 25 automatic recorder sta-

tions operated by the Highway Planning Survey. Traffic volume in previous months, since operation of the recorder stations was resumed Jan. 1, showed the following percentages compared to the same months in 1941: January, 95.8; February, 93.9; March, 105.7. Operation of the stations was suspended during the war.

★ Please, Better Street Signs

Now that the war is long since over there can be no excuse for the lack of clear street name signs in our cities. It is a spectacle to see despairing local citizens and bewildered visiting motorists, alike, stopping at filling stations, leaning out at pedestrians, or otherwise turning into Hawkshaws just to learn what street they're on. Local city government gets a black eye in a hurry, as there's nothing

else to believe than that the city hall is filled with a bunch of slovenly, negligent people.

Of course there's always another side. Signing streets is a big and costly job, and city fathers don't always provide the necessary funds. But part of the trouble is a lack of knowledge as to what constitutes the most legible size, type and location of

street marker. Letters painted on curbs, so often seen by this editor, fade out in a hurry, are easily hidden by adjoining parked cars or by passing pedestrians. Signs should be at eye level or higher (but not too high) and most important of all should be large enough to be read across the street and easily made out at night in the car headlights.

★ Memorial Day Toll

Ho hum, goes the average newspaper reader as he reads statistics on traffic accident fatalities. But highway and street engineers and officials, at least, should have paused with grave concern on reading of the hundreds killed on our highways and streets during the week-end of Memorial Day.

As was emphasized at the President's Safety Conference, the problem calls for waging war locally on a national front, with all agencies co-operating. In this election year, sad to say, enforcement agencies will show leniency in dealing with traffic offen-

ders. The efforts of all will be inevitably slow in bringing even a small drop in the rate of accident per million vehicle miles, which is the only real yardstick of results.

But the engineering factor continues to challenge, and the slaughter this summer should spur us all. New Jersey's bold program of multi-lane limited access expressways is one of the notable postwar accomplishments to date. You'll be given the details in these columns next month. Meanwhile there are hundreds of small, inexpensive improve-

ments that cry to be done—easing curves, widening at danger spots, de-slicking slippery surfaces, fixing shoulder ruts, knocking out narrow bridge headwalls, putting up better warning signs, channelizing traffic at complicated intersections, rerouting through-town traffic from Main Street to a side street, you name some more. And pardon us if we've said all this before. We'll keep on reiterating these obvious needs just as often as we come in from a trip wondering how we ever got home alive.

★ More Highway Money

Colorado in common with several other states, finds itself in serious need of improving its highway finances, as the basis for a revitalized highway development program. Various organizations, whose interests lie in good highways and in a continuation of that state's vast highway tourist business, are actively campaigning for a two cent increase in the state gasoline tax.

As with any such campaign, there is no influence so great as that of the leading newspapers of the state. In the case of Colorado the *Denver Post*, a power in the state, has heretofore been reactionary. Under its new dynamic editor, Palmer Hoyt, it has seen the light, and we present for the serious reading of highway

leaders everywhere, the following recent editorial in that publication.

COLORADO'S DECISION

Colorado has three choices in making its decision on a postwar highway plan.

It can increase the state gasoline levy to bring in enough money for a good road program.

It could borrow the money by issuing bonds or anticipation warrants.

Or, it could try to get by with an inadequate highway program and find itself bypassed by commerce, blockaded to the westward march of industry and detoured by the nation's vacationists.

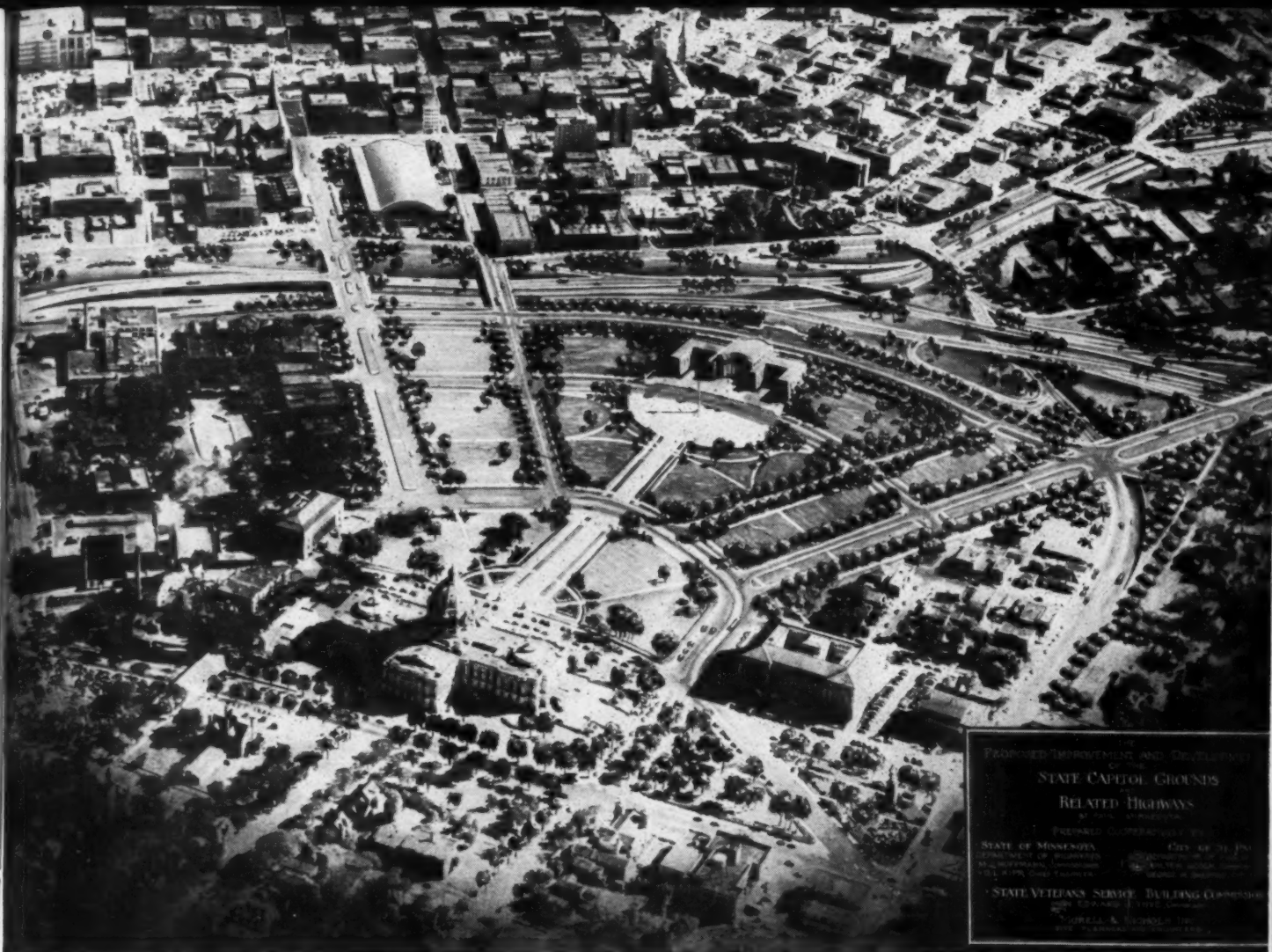
If we chose the last course, we would bog down in our own cow-paths. Except for the geographical impossibility, Colorado would as well

withdraw from the Rocky Mountain Empire as to allow itself to lag behind the other states of the west in road building.

Should we borrow? Let's look at some figures from the state treasurer's office and seek the answer to that question.

In 1936 Colorado issued 25 million dollars worth of highway anticipation warrants to build the foundation of its present road system. That was during the depression. The state was broke and thousands were out of jobs. Colorado at that time might have been said to have no roads. The motorist who could drive from Denver to Alamosa or Grand Junction in a day without breaking a spring or having tire trouble was the exception.

(Continued on page 102)



St. Paul Plans New Civic Plaza

AN idea of how the area in front of the Minnesota state house at St. Paul will look three to five years hence, is shown by the above re-touched air photograph.

The project is a joint state-city venture to cost about 6 million dollars. Located on the edge of the downtown business district, it will accomplish several major civil purposes as follows:

1. Provide much needed arterial street facilities. Beyond the approach proper (in background of scene) is shown a link in the proposed new east-west inter-regional highway. This highway will divide here, one branch leading westward toward Minneapolis (right center of scene) and the other leading under a series of viaducts to connect with an urban avenue and on to the south. The state has begun condemnation work on this arterial and plans are under way.

2. Local street traffic will be served by provision of new or widened streets in the area. Some city street traffic, including street cars, will be rerouted and congestion eliminated. Several connections with the new inter-regional are provided. The city has authorized an expenditure of 2 million dollars on streets and other construction.

3. A Veterans' Service Center (center of plaza) is a feature. Another 2 million dollars is authorized, and an architects' competition is planned for the design.

4. A beauty spot will emerge in what is presently a blighted area.

City engineer George M. Shepard and commissioner Milt Rosen are working on the city's part, while the state highway department under chief engineer O. L. Kipp is designing the arterial and approaches.

Illinois Gas Tax Boost Suggested

An increase in the Illinois gasoline tax, from 3 to 3½ cents, as a means of aiding township roads, has been proposed to a state legislature committee. The funds would be spent by township commissioners, which at present have no such state-aid source of revenue, and would yield 3 million dollars. A 15-million dollar state appropriation for roads made in 1945 has been largely spent.

40 Mile per hour prima facie speed limit for six New England states has been recommended in the preliminary report of Committee on Street and Highway Safety of New England Governors' conference.



"Mobility" ...

10:05 A.M.

←
★ Last load before moving plant to new spot farther along the pit. Note shop-built 6-yd. body fitted on army "six-by-six"

10:09 A.M.

→
★ Taking out the jacks in preparation for the move. Jacks loosened and blocks thrown out in a couple of minutes



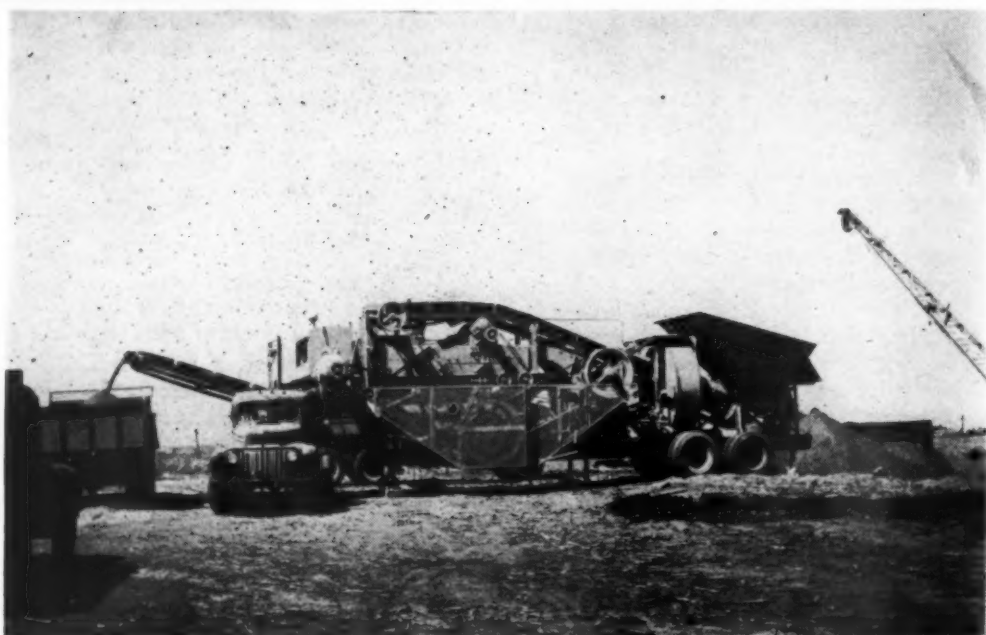
10:12 A.M.

←
★ Step on the starter and here we go! The drag-line has already moved, and its operator is making a trial swing to spot the location of the crusher's hopper, while the crusher is about to be jack-knifed back into new position



10:17 A.M.

→
★ Jacks reset and production resumed. The trailer-type truck can be detached from the aggregate plant and put to other use while this location is being worked



... is the Word with MAUDLIN CONSTRUCTION COMPANY

**This Iowa road surfacing contractor
moves each crushing plant to ten or
more pits per season**

IT USED to be that a crushing plant earned its keep by, well, just crushing away. But in Iowa, where aggregates are available most everywhere, a crushing plant may be here today and gone tomorrow. With post-war competition the way it is, contractors often figure that they make their profits in the degree of mobility.

At least that is the philosophy of the members of the Maudlin family who comprise the Maudlin Construction Company, well-known surfacing contractors of Webster City, Iowa. This company does business all over north-central Iowa, where gravel and sometimes stone are widely available. One of their keys to economical operation is the judicious spotting of pits, the idea being, of course, to minimize hauling with a reasonable number of pit-to-pit moves per season. As an example, a typical county highway program on which this company might bid is likely to require ten or a dozen pits in a working season.

Last year the company produced and either stockpiled or tail-gated 370,000 cu. yd. of material for county and state road work, all of the material being one-inch-minus. Equipment presently owned includes three portable crushing and screening plants, of three different "makes." One of the units is new (the one pictured), while the others are older units that have seen a lot of service. The other two plants started the 1946 season in thoroughly renewed condition, having been overhauled in the contractor's headquarters shop.

The photographs show the company's newest crushing and screening plant, producing ½-in. blotter coat gravel near Webster City. This is an old, extensive workings, and al-

most daily moves along the pit were necessary. "About ten minutes and such moves are done these days," observed the contractors, "whereas with old style 'portable' equipment the good part of your day was wrecked and a lot of sweaty man-hours spent at a chore which is now but a brief pause."



★ Wayne Maudlin, of the contractor organization bearing his family name

Truck Worries Continue

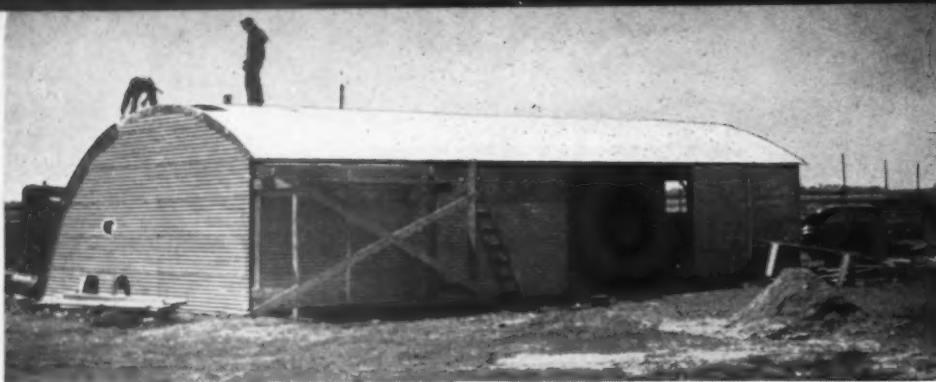
But trucks and not crushers are the subject of greatest concern these days to Iowa contractors, Maudlin Construction Company included. The company started the season with eighteen units of 4 and 6-yd. capacity. Some of the trucks were purchased from



★ Combination greasing outfit and fuel wagon, as fitted out for one of the Maudlin Construction Company jobs

★ Contractor's new fireproof shop near Webster City, Iowa. Note the 16-ft. clearance of the door





★ One good use for GI huts—new storage shed for tires and small equipment

army surplus, reconditioned when necessary, and fitted out by the company's shop crew with home-made steel-and-wood dump bodies to offset delayed delivery on manufactured bodies. Certain parts continue to be very scarce.

Fairly light, speedy trucks are preferred by this outfit, and two-speed dual axle equipment is especially sought this year.

The Maudlin people rent extra trucks as needed, and now find them readily available. But they prefer to have a fairly large fleet of their own for two reasons. The best size and type of truck will then be always on hand when needed; and, more important, the drivers will be available to help out at the pit and thus lend flexibility to the organization.

Systematic care of equipment is another foundation-stone in this company's success. Two service trailers usually go with each crushing plant. One is for tools and parts and the like, and the other houses grease, oil and lube equipment. The policy is to catch all trucks once a day and also give them a thorough going-over once a week. The weekly check-up includes attention to universal joints,

springs, oil and dust filters, etc.

Two mechanics stay in the home shop in summer; a larger crew is kept busy in winter. Each outfit in the field has a service man who doubles on other chores, in addition to two men on the crusher, one on the dragline, two helpers and a foreman. A portable rig equipped with a gasoline pump and diesel fueling station also goes with each job, as do various trailers for housing members of the crew.

High-Ceilinged Shop

A word about the company's new shop at Webster City. The main building, constructed especially to fit the owner's needs, is 48x64 ft. in area and includes a concrete floor and fire-safe walls and roof. The principal features of interest are the high clearance inside and the 16-ft. high doors at either end, which will accommodate the portable aggregate equipment on the market today. When fully equipped, this shop will have a lathe and complete facilities for motor overhaul and other mechanical maintenance.

Adjoining the shop is a storage building of sectional army hut con-

struction. Tires will be stored here, on a high-level timber floor designed to keep tires up out of the dampness and also to speed loading of tires and other heavy items directly into truckbeds.

New York Restricting Billboards Along Thruways

The Outdoor Advertising Association of New York has agreed that its members will refrain from erecting billboards on or along the proposed new Thruway, and that it will cooperate with the State Department of Public Works in its program to improve safety conditions on the State Highway system.

Under the terms of a resolution the outdoor advertisers have agreed not only to refrain from constructing billboards along the non-business areas of the Thruway but also give assurance that they will:

1. Upon the request of the Superintendent of Public Works, move, remove or alter any advertising structure which, in his opinion, is detrimental to safe operation of vehicles on the State Highways.

2. Erect no advertising structure containing flashing or intermittent electrical illumination along or adjacent to any State Highway.

3. Where electrical illumination or reflector type signs are used, refrain from the use of the colors red or green if use thereof would create visible confusion with traffic or official directional signals.

Immediately upon receipt of the agreement superintendent of public works C. H. Sells initiated steps to survey all billboards along state highways before asking the outdoor advertisers to undertake any major correctional moves. Working through the districts, V. L. Ostrander, superintendent of operation and maintenance, and Nelson M. Wells, principal landscape engineer, will make a census of all signs along state highway outside of business areas. This study will be to determine the type, location and size of existing billboards and to discover which ones incorporate objectional features.

At the conclusion of this survey Mr. Sells will meet with representatives of the advertisers to outline whatever changes are recommended. He will endeavor to secure similar agreements from billboard owners who are not affiliated with the state association in order to achieve complete cooperation of all outdoor advertisers in the state.

★ Does it meet specifications? Weighing and drying specimen of 1/2-in. aggregate



Federal Airport Act Approval Sets Stage for Action

PASSAGE of the Federal Airport Act, to be administered by the Civil Aeronautics Administration, has removed a number of the uncertainties which have retarded airport development recently.

Several additional steps remain to be taken before this comprehensive program can be put into operation. First of all Congress must make appropriations for both planning and construction. Early action in this regard is predicted. The other prerequisites concern various stipulations of the Act, such as bringing the National Airport plan up to date and the passage of local enabling legislation.

The Act, as finally approved, is in substantially the same form as that described in the April issue of *ROADS AND STREETS*. There is a relatively small change in the apportionment of money to each state from that shown.

Summarized, the act authorizes Federal aid to the extent of \$500,000,000 as the Federal government's share of the national airport cost over the next seven years. Annual appropriations are limited to \$100,000,000. Federal funds will be apportioned to the various states on the basis of area and population of each state in relation to the area and population of all the states. Federal aid applicable to construction costs will, in general, run about on a 50-50 basis. Provisions are made for extending Federal aid to the Territories as well. Any public agency, or two or more acting jointly, may file applications for financial assistance. Only those projects listed on the currently revised National Airport Plan are eligible for Federal aid. CAA must submit to Congress before the end of each fiscal year detailed information on all Class IV and V airports which it recommends be undertaken during the next fiscal year. Congressional approval is required for each of these large airports.

Survey of Needs

The Federal Airport Act provides for a complete survey of airport needs throughout the country, and preparation of an up-to-date National Airport Plan. An appropriation of \$3,000,000 for this survey is expected at this session of Congress. The survey must be made before applications can be considered.

Pending this appropriation, CAA officials from all parts of the country have been busy in Washington drafting tentative regulations for operation of the airport program. Supervisors of airport work in the CAA's seven regions attended the meeting which was concluded May 29. The preliminary draft of these regulations will be submitted to federal, state and municipal aviation officials for comments and suggestions before the final draft is adopted.

CAA Marks 20th Anniversary

Aviation industry has come of age during life span of U. S. agency

The Civil Aeronautics Administration this month marks the 20th anniversary of Federal regulation and fostering of civil aviation.

When President Coolidge signed the Air Commerce Act on May 20, 1926, he vested in the Department of Commerce the first specific governmental responsibility for what was destined to become a great new industry. Today a handful of CAA veterans remaining out of the 200 who started the agency can recall those infant years of aviation and put in true proportion the tremendous strides made in two decades.

The pioneers who launched the Aeronautics Branch of the Commerce Department in 1926 had the task of nurturing an industry which produced in that year just 658 civil aircraft. The 1946 output is expected to be 50 times that number.

When Aviation Was Young

Exactly 5,782 citizens ventured to ride the airlines which the 1926 fore-runners of CAA inspectors checked for safety. This year it is estimated that 10,500,000 passengers will ride scheduled U. S. carriers with the knowledge that their operating practices meet high CAA standards.

The 1926 traveler could cover 8,404 route miles by air. By the end of 1946, the routes of U. S. airlines will extend for approximately 150,000 miles.

CAA hopes to have all of the spade work completed early in October and at that time be in a position to begin accepting preliminary applications for government assistance. It is generally conceded that construction cannot be started on any projects until April, 1947.

Of particular interest to private engineering concerns is the fact that project surveys and detailed plans are to be prepared by the local sponsor, following general and basic engineering principles established by CAA. This plan, as differentiated from CAA practice heretofore of doing this work with government forces, should provide ample opportunity in the airport field for qualified consulting engineers.

The "wild blue yonder" was populated by 1,572 certificated pilots in 1927, and this year is expected to see the CAA pilot rolls reach 345,000.

To light the sky roads in 1926, there were 2,041 miles of federal airways. "To light" is literally what they did, for there were 719 beacon lights and only 17 radio broadcast and marker stations. This year the CAA airways system will cover 41,000 miles, offering pilots comprehensive radio guidance for navigation and landings in almost any weather and in every important community of the United States, and in an ever expanding coverage of the globe.

Aviation was an insignificant source of employment when CAA was born. Earliest available records show 5,486 working in the manufacturing phase during 1927. CAA estimates production employment will reach 250,000 by the end of 1946.

CAA at "Grass Roots"

In making its contribution to the growth of U. S. civil aviation, the CAA itself has grown from an organization of 222 employees in 1927 to more than 10,000 today. CAA personnel are scattered over the entire United States and in many foreign countries—only 10% of the total are located in Washington.

The bulk of CAA employees, approximately 8,200, are engaged in

(Continued on page 118)

JOB and EQUIPMENT IDEAS

Send in your contributions to this idea exchange and help road building progress. **ROADS AND STREETS** will pay a minimum of \$10.00 each for any publishable field or office methods or shop kinks. Why not pass this along to your staff and encourage them to send in brief "how we did it" descriptions, rough sketches or snapshots.

This Mechanical Cutter Makes Neat Pavement Openings

Usually when the paving breakers go to work on a concrete slab, the edges of the opening are ragged and irregular, in spite of the most skillful handling, and this is unfortunate because neat edges help make a perfect patch.

For this reason, engineers and contractors should both be interested in the accompanying snapshots. Shown here is a machine devised by a contractor in the Cincinnati area, and a couple of nice looking cuts made with it. We cannot tell you what is under the hood because the photos were taken when the machine was not in use. The photos were snapped by Mr. Hames of the Ohio Department of Highways construction office.

At any rate, it is a gasoline powered rig. The engine drives the cutting wheel which is pulled back and forth along a straight path by means of a winch. The depth of the cutting is controlled so that successive passes deepen the notch until it is about two inches deep.

The paving breaker then starts from the center of the area to be removed, working toward the edges. The result is a neat break as shown in these snapshots. Needless to say this machine saves some hand work. We can think of several mechanical principles by which similar units might be built.

Think Safety, Every Day

Are you watching your safety practices on the job? Lots of new employees these days, and we note a laxity here and there.

For example, never leave a truck body raised without shoring it up with a post supported on the ground

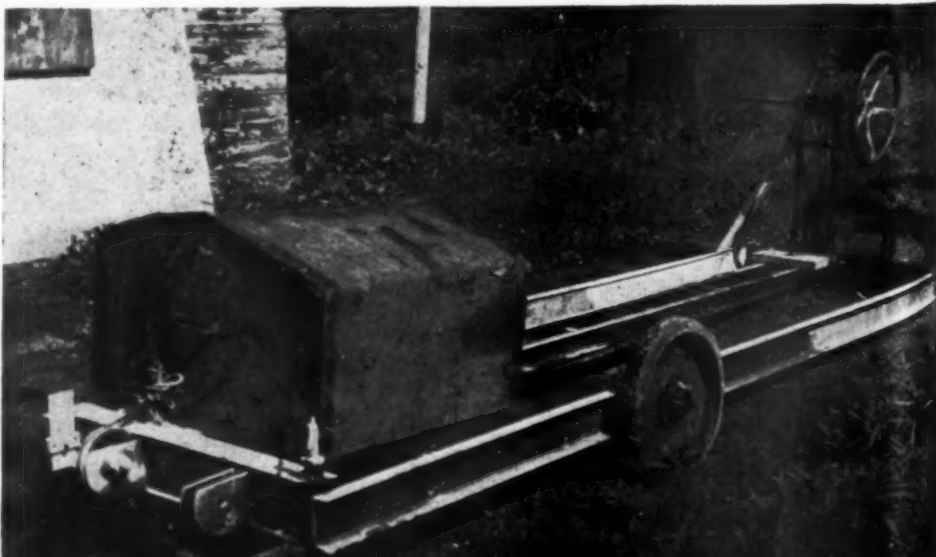
or securely anchored on the truck frame.

Particularly around shovels and draglines and cranes, danger lurks all the time. Best thing is to have all employees keep clear away from

such rigs unless they have business near. And then daily reminders are needed to help every fellow keep alert to the danger of bumping by swing cabs, falling rocks, backing trucks, etc.



★ Note the straight, clean edges around this cut
★ Mechanical pavement cutter, gasoline powered





★ Another cut, with sub-grade material tamped back in place. Also showing the completed patch



340,000 Cu. Yd., 65% Rock, Handled with Scoops

We didn't get to see S. E. Evans Construction Company of Fort Smith, Ark., on their 5.2-mile project, finished up on highway No. 10 in north-eastern Oklahoma last year. But it was some show, and a mighty nice, profitable job from all reports. Dozers and three big 20-yd. tractor-drawn scrapers did it all, according to O. H. McLaughlin, who was resident engineer.

The 341,000 cu. yd. of unclassified in the project ran about two-thirds limestone of a type which shattered well in blasting. Some big cuts were involved—one cut skirting a lake was 120 ft. high and measured 65,000 cu. yd. After taking a good look at the job the contractor decided to try it without shovels, and get by by dozing big rock into place wherever possible for the 50,000 cu. yd. of water-side rip rap called for. Unclassified was

bid at 36c while plain rip rap was \$1.75.

The tractors and scrapers handled the rock OK, but the job was said to have chewed a bunch of rubber to pieces. When the going was best the three big scrapers and several heavy

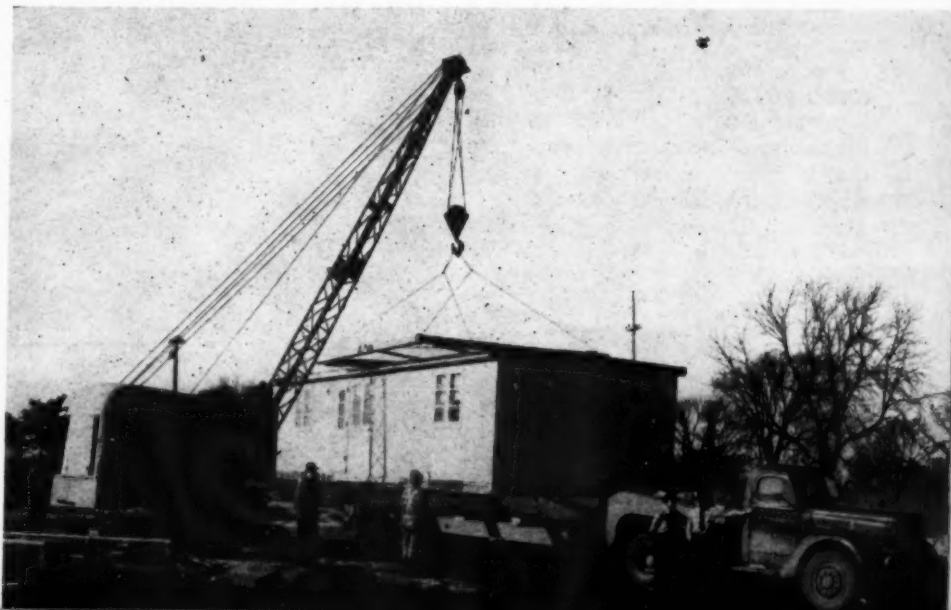
bulldozers moved 35,000 cu. yd. in eleven 10-hour shifts.

Two other tricks were used on this job. Self-powered 15-yd. scrapers spread surfacing gravel with a 7-mile haul. And a good deal of the rock was drilled with a rig consisting of two wagon drills and a compressor mounted on a heavy tractor. This same kind of a get-up, incidentally, was used by Western Contracting Corp. on an airport at Parkersburg, W. Va., last year [see R&S May, 1945].

The International 87 Highway Association, which met in Denver in June, is composed of individuals and associations along the route of U.S. 87 and of connecting links extending from Fairbanks, Alaska, to Guatemala City in Central America. Its objective is to foster improvement of travel conditions and economic development along this route.

Road Contractor Moves Houses on Machinery Trailers

How to move a semi-portable house of the type erected during the war for defense workers, is depicted in the accompanying photograph. J. D. Armstrong, enterprising contractor and trailer manufacturer of Ames, Iowa, did this moving job. Note that he is using one of his own machinery trailers, but the point of special interest is the steel frame used over the top of the house in fashioning the four-cable sling. This is one of many houses, some up to 36 ft. in length, trundled over the road from Badger Ordnance Depot at Baraboo, Wis., to the State College at Ames, Iowa, where they were set up to supply housing for students.



Congestion Relief on N. J. Highway Promised by

Overpassing a Traffic Circle

Novel design greatly increases capacity of intersection without requiring much additional property. Pavement joint installation to be made subject of field study

THE complex nature of the problem of handling the ever increasing volume of traffic on our highways is forcefully brought home by the scope of a contract with F. A. Canuso & Son of Philadelphia. This firm is modernizing a traffic circle near the Camden, N. J., airport, at an intersection which has been swamped by a 58,000 average daily and 90,000 peak traffic. The cost of this improvement will be in excess of \$700,000 and is scheduled for completion in July. An outstanding feature of the job is the fact that construction is carried on in such a manner as to interfere very little with the heavy flow of traffic now using the circle.

The existing circle, completed in 1925, embodied a very forward-looking design as is borne out by its adaptability to a solution fitting present-day conditions. The first and still the largest highway traffic circle in the state, it has an inside diameter of 300 ft. and a 40-ft. roadway. Located two miles east of the Admiral Wilson Boulevard Bridge across the Delaware River, the circle handles Camden and Philadelphia traffic to and from the short points and Garden State race track. In addition, it serves N. J. route 25 (U. S. 130) which is the heavily traveled by-pass highway connecting New York with points south.

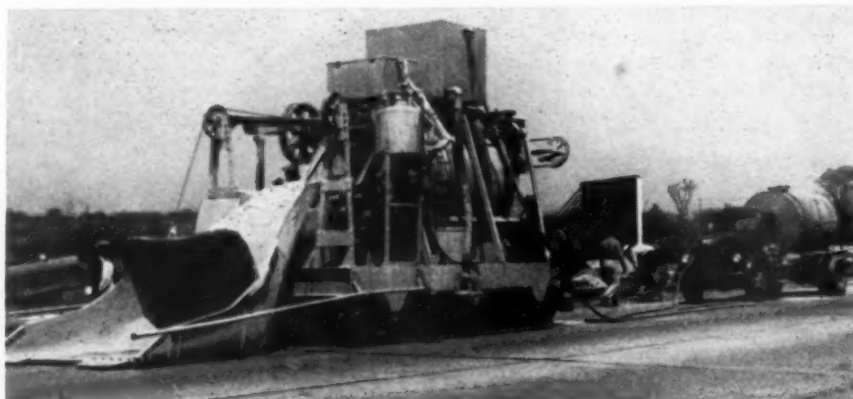
Combined Circle and Y

The modified design is such that the capacity of the original circle will be increased due to the relief afforded by the new features. Wherever the new structure or its approaches encroach on the original layout, the old pavement is being widened a corresponding amount.

The improvement consists of a Y shaped structure of three 34-ft. roadways and is essentially an overpass built above the circle. The stem, or westerly section of the Y, ties into the center of Admiral Wilson Boulevard about 500 ft. from the circle. An earth-fill ramp, confined by reinforced

concrete walls, carries this roadway to an elevation of 14 ft. above the circle pavement. Bridge-type construction is used where the roadway

crosses the circle. The center portion of the Y is earth fill. The left-hand fork of the Y ties into route 38 running east while the right-hand fork



★ Tank truck equipped with pressure pump supplies water to dual-drum paver, making pipe lines unnecessary



★ Dual-drum paver placing concrete for widening. Note the bevelled edge boards in place to provide bottom cut of contraction joint



★ Aerial view of circle looking southeasterly. Note partially completed ramp and overpass on Admiral Wilson Boulevard in right foreground

ties into route 45 leading south. The completed work can well be described as a Y above a circle.

Control Scheme for Commuter and Outing Traffic

The one-way traffic principle, using traffic lights, will be used to control traffic using the Y. East-bound traffic will be allowed to enter the Y only from Admiral Wilson Boulevard and can leave it by either route 45 or 38. West-bound traffic for Camden or Philadelphia will enter the Y from either route 45 or 38 and can leave only by way of Admiral Wilson Boulevard. The Y will be used exclusively by east-bound traffic at such times as the predominate amount of traffic is going that way. West-bound traffic will take precedence whenever the volume of traffic warrants as will be the case when week-end crowds are returning from shore points, when race-track crowds are returning home, or when there is an early-morning influx of workers to Camden and Philadelphia. The use of the Y, how-

ever, will always be optional with the driver and he may use the circle if he so desires. The overpass structure does not call for any change in the present one-way traffic pattern around the circle.

Dummy Crack Control

The pavement section is 10 in. thick non-reinforced concrete laid on an 8 in. bank-run sand subbase. The original design called for the use of

reinforcing mesh and dowels at expansion joints. Due to materials shortages the reinforcement and nearly all expansion joints were eliminated. Expansion is now being provided for by contraction joints spaced from 14 to 19 ft. apart. Positive vertical cracking of detail contraction joints is assured by standard 1 1/4 in. slots cut in the pavement surface positioned in conjunction with under-side slots formed by a 3/8 in. wide by 1 1/4 in.

★ Admiral Wilson Boulevard ramp and overpass partially completed





★ Foundation conditions required piling. Forms have been driven preparatory to pouring cast-in-place concrete piles



★ Pouring concrete on Admiral Wilson Boulevard overpass during winter. Note protective covering around forms

high beveled board. In this manner the slab is notched top and bottom a total of $3\frac{1}{4}$ in.

New Jersey research engineers have selected over 1000 joints on this project for careful study over a long period of time to determine the extent

of any lateral or vertical movement of the slab ends.

A small square area on each side of the joint is carefully smoothed for the purpose of taking level rod readings to determine any vertical movement of the slab. The elevation of



★ Measuring gauge devised for checking lateral movement of pavement slabs. Note square areas behind gauge smoothed to provide taking of accurate level rod readings

each side of each joint will be checked periodically.

One-half inch round brass plugs, $1\frac{1}{2}$ to 2 in. long, are being inserted in the concrete during the setting period. The tops of the plugs are flush with the pavement and have small holes to accommodate a measuring gauge. The plugs are set about 10 in. apart, one on each side of the joint. The engineers have devised a gauge which can be read to the nearest one-thousandth of an inch. The distance between each set of plugs is being recorded soon after the concrete sets.

Additional measurements will be taken from time to time for the purpose of determining lateral move-

(Continued on page 101)

★ Two mudjacking machines and crews raising pavement on Admiral Wilson Boulevard approach



Lumber Shortage a Critical Problem on Bridges

Situation summarized by memorandum to AASHO members, reviewed herewith along with comments from Louisiana where the need is particularly critical

ONE of the postwar highway problems not fully anticipated is the continued scarcity of lumber. Both bridge timbers and form materials are so short that many seriously needed repairs and replacement projects are being slowed up.

A special committee of the American Association of State Highway Officials early in May discussed the situation with the Civilian Production Administration and presented a supporting statement of the need to CPA. Following are excerpts from a report to members made recently by Hal H. Hale, Executive Secretary, of AASHO.

"The 48 State Highway Departments are face-to-face with a most serious problem as a result of the current shortage of lumber. Having been, in general, unable to obtain lumber in any appreciable quantity during the war years, much deferred maintenance, particularly in timber and combination timber bridges, has accumulated. Present conditions give little encouragement to an early alleviation of this situation.

"With the already critical lumber situation facing the current home building program and the great demand for lumber for other uses, the departments are apparently going to continue to have difficulty in obtaining badly needed maintenance lumber supplies. The situation is so critical in some areas that we cannot exclude the possibility of a serious disruption in the highway transportation system of the country as a result of this inability to repair and maintain the great number of timber bridges on the highway system.

24 Million Board Feet Needed

"A survey of highway department lumber needs in the field of timber and combination timber bridges has just been completed. Forty-five of the 48 states have replied to the inquiry, with eight states indicating that their situation had not yet reached the critical stage. In the remaining

thirty-seven states, there are 65,814 timber or combination timber bridges, totaling approximately 695 miles in length. All of these structures are on the highway system of the States and the State is responsible for their maintenance. Bridges off the State system are not included. The indicated shortage of timber needed for urgent repairs to these structures at the present time totals approximately 24,200,000 board feet. This quantity will increase rapidly if the needed maintenance is deferred longer.

"Priority ratings in the case of two particular states have been denied. California sought, among other things, priorities for material in the amount of 80,000 board feet to repair a burned-out timber bridge on one of their important highways. The total amount sought in California was 200,000 board feet, the additional 120,000 being for other urgent requirements. Civilian Production Administration denied the request. A similar request in the amount of 987,140 board feet for Texas has just been denied.

"Apparently, the difficulty stems from several sources: (1) the inability of the lumber industry to produce, under present conditions, the required amount of lumber to meet the country's needs; (2) restrictions growing out of the understandable effort to channel urgently needed lumber into the critical housing program, resulting in the inability of some state departments to buy their lumber through normal channels without first having priority rating; and (3) inability to buy lumber under certain OPA ceiling price requirements, such as the pricing of select grades of lumber in such a way as to confine its sale at that ceiling price to railroad uses. Undoubtedly, there are other contributory causes. Just what recourse highway departments may have in attempting to get relief in this situation has not yet been determined. It is clear, however, that unless some such relief is obtained, they are confronted with the bare ne-

cessity of having to close important roads on which timber bridges have failed or are in danger of failing.

"The State of Oregon, one of the largest lumber producing states in the country, has 1,750 wooden bridges on its highway system (North Carolina has 29,000) and requires 630,000 board feet of lumber for maintenance purposes and, up until this time, has been unable to obtain any appreciable part of its requirements."

Louisiana Needs Thousands of Timber Bridge Replacements

From N. E. Lant, bridge design engineer, Louisiana department of highways, comes the following letter which forcefully presents one state's case:

"We have on the Louisiana state highway system several thousand timber bridges ranging in age from a few years to 25 years. The older bridges, say 15 to 25 years old, generally require complete reconstruction or replacement. We have been doing this as promptly as funds permitted and materials were available, both before and during the war period. In 1943 and 1944 we reconstructed or replaced a great many of these bridges, especially on the Strategic System of Highways. Since about the middle of 1945 this type of repair or reconstruction has almost entirely ceased due to the difficulty of securing treated timber and to high cost slow delivery when obtainable.

"We carried out a considerable amount of timber bridge repair work using local untreated lumber, such as mixed oak, during 1944 and 1945 but this type of construction is not generally satisfactory. On jobs where treated timber was required and used we have been forced to accept a lower grade than our standard specifications require and also it became necessary to permit the use of more than one specie of timber on the same contract, such as Southern Yellow Pine and Douglas Fir.

(Continued on page 102)

Elastic limit basis for determining

Load Supporting Power of Soil Substructures

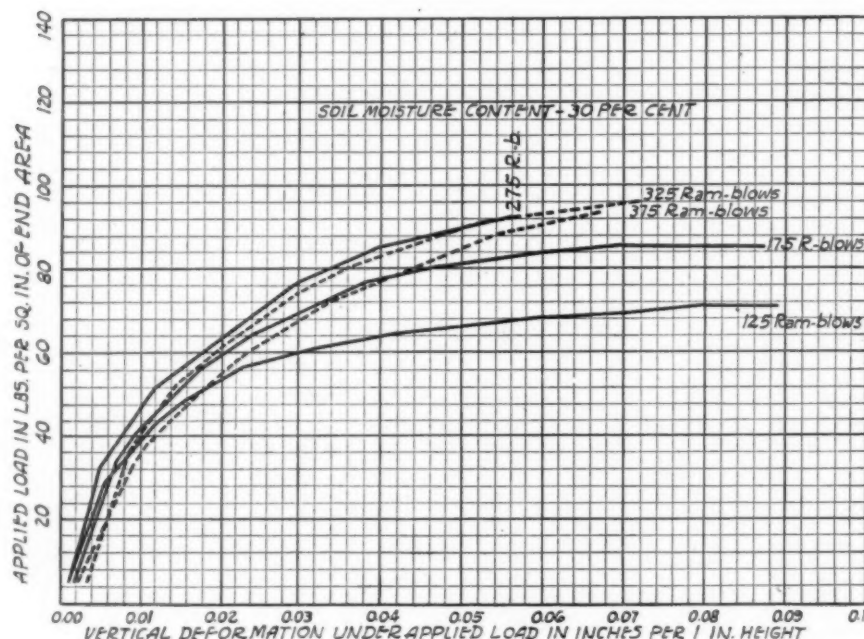
By V. J. Brown

Lt. Colonel, Air Corps, Air Installations
Officer, Air Technical Service Command,
Oklahoma City*

WHAT is discussed in this article is the work of a recognized research engineer. He knows more about this subject than I can hope to know but I have presented a part of his work here that I believe will be well accepted by the highway engineering and construction industry. My job, in presenting this article, is that of a salesman. I hope to sell this method of soil construction control, for use in building soil structures. This article presents the elastic limit concept as a basis for determining the load-supporting power of soil structures, and for controlling field construction.

If a soil substructure is to properly function in doing its job of maintaining a smooth riding surface for a road, the criteria of its load supporting power must be respected. Therefore, this discussion concerns itself with the load supporting characteristics of soil structures. A structure with a relatively large amount of compressive strength can be created economically in a clay soil by properly compacting it when it has comparatively little moisture in it—as much as 200 psi. in some clays. However, regardless of the amount of compressive strength created in the soil by compacting, if that clay soil eventually absorbs enough water to saturate it, a large percentage of the compressive strength will be lost.

For the details of the tests from which the conclusions in this article were derived, the reader is referred to the published and unpublished work of Henry C. Porter, Research Engineer, Texas Highway Department, Austin, Texas.



★ Figure 1

We engineers, therefore, must become reconciled to the fact that we will have to do one of two things: (1) prevent excessive amounts of water from ever reaching the compacted clay soil sub-structure, or (2) mix or treat the soil with some kind of economical waterproofing before or during the time the soil is compacted in place.

With the enormous amount of public money (compared with past years) to be invested in postwar roads, a revision of present methods of designing and constructing roads is very badly needed.

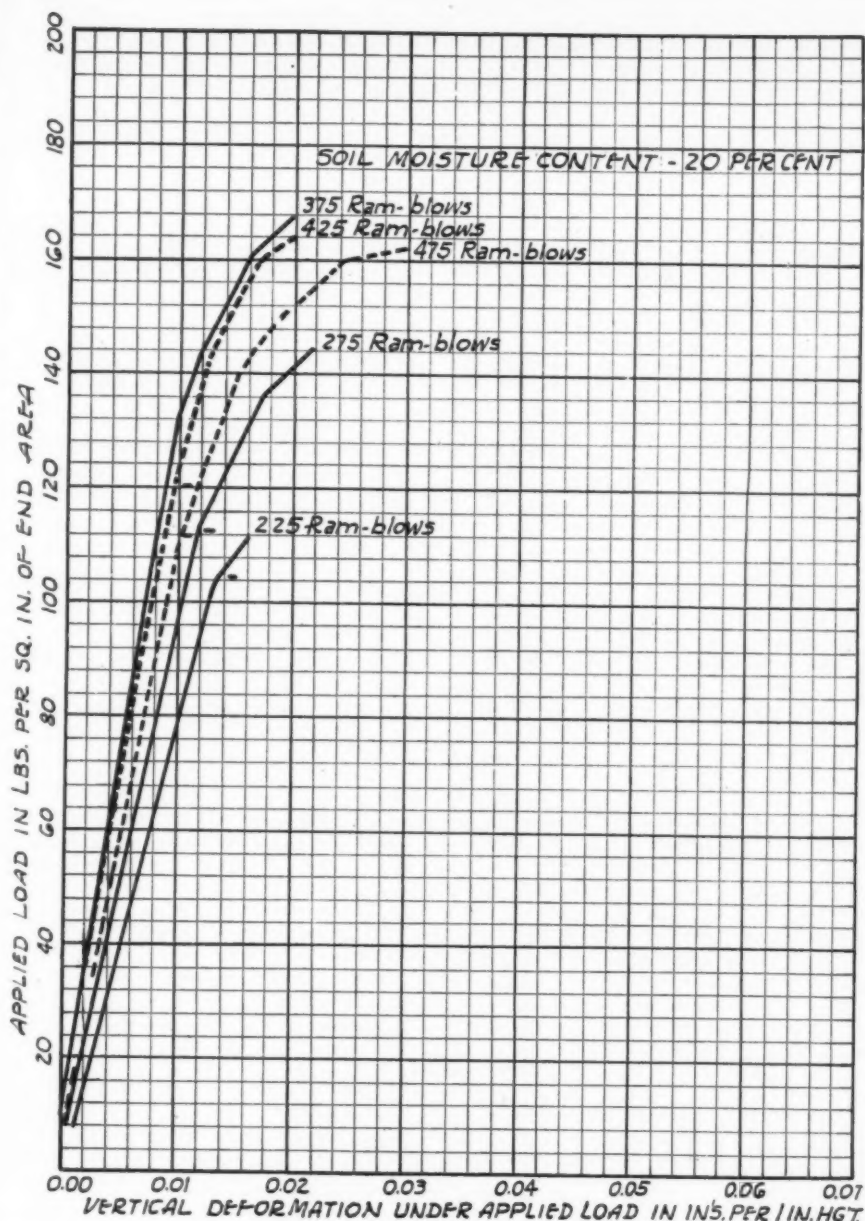
The preparation of the clay soil substructure, in such manner that it will carry maximum traffic loads continuously without rupturing, is sufficiently important to be reiterated.

Principles Restated

The more densely the soil is consolidated, the greater is its rupture

load; and the density to which the soil can be consolidated depends upon its type, its moisture content, and the amount of energy exerted in compacting it. For a certain clay soil, the greater the compacting force used (weight of roller and number of trips, for instance) the smaller is the optimum moisture content for obtaining maximum density, and vice versa. Dense soil being the objective, it appears that raising the moisture content by deliberately adding water during construction (unless the soil is powdery dry) defeats or tends to defeat the purpose. The maximum density with the lowest practicable moisture content should be obtained by regulating the consolidating load applied to fit the existing natural moisture. Often, excavated clay soil contains a very high moisture content that it is impracticable to reduce ap-

*Publishing Director, "Roads and Streets" (On Military Leave).



★ Figure 2

preciably. If that soil must be used, its high moisture then will govern the amount of compaction-loading that will produce the greatest density or load-supporting-power in the soil substructure; and the compaction-loading to obtain maximum density will have to be fitted to the high moisture content. That "optimum-load" should be predetermined by experiment in the laboratory, perhaps. Having done that, the next step is to correlate those data or findings with the results of field construction compaction, and compact to a predetermined figure.

Prompt Cover After Consolidation

If the clay soil, after it is properly consolidated, is allowed to remain uncovered and exposed to the elements, its top, at least, is apt to

dry rapidly and crack. If it then is suddenly wetted by a rain, the soil will disintegrate and later it often is difficult to tell by visual inspection alone whether the soil is in the form of a consolidated integral structure or a mass of disintegrated, poorly connected, soil particles. Where precautions are not taken, therefore, the soil is liable to be in a disintegrated state when pavement is laid thereon. Thus, later, such soil will cause defects to develop in the riding surface. The wetted and consolidated clay soil substructure generally should be covered the day it is finished.

It is also important to prevent disintegration of the consolidated soil structure after pavement is laid. Keep joints and cracks filled. Keep shoulders down so they slope away from the pavement edge. Pumping at joints will rapidly follow if the water

is not kept out from above and also, more important, from below. In addition to loss of load-supporting-power, accompanying volumetric change or bulking of the soil is apt to cause irregularities to develop in the riding surface.

In roads that are already built, joint pumping and slab settlement conditions are superficially corrected by mud-jacking the slab to grade and/or sub-sealing with bituminous materials.

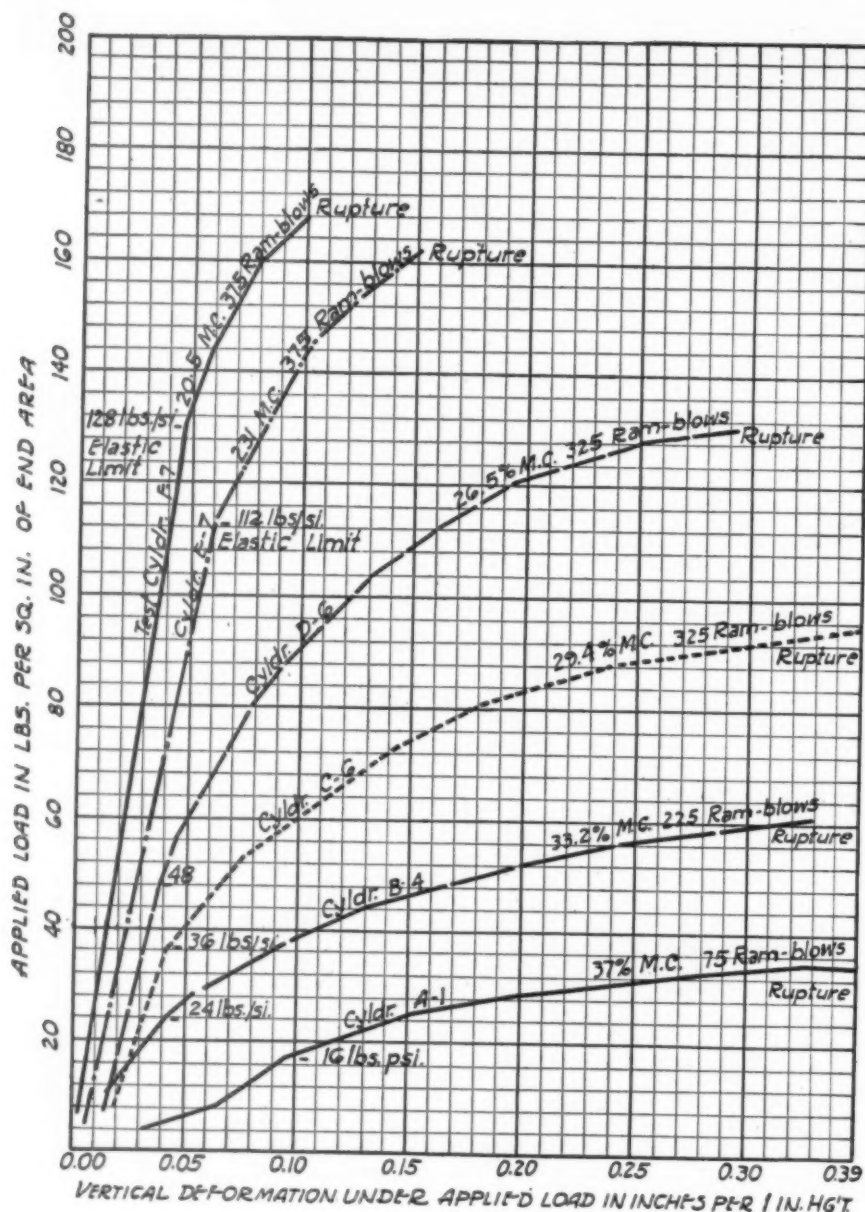
Constructing in the manner this discussion advocates would be a long step forward in eliminating the causes of irregularities and failures. Compiled data on one road which was closely watched show that the maximum moisture content, fluctuation of some of the test sections during the three or more years of testing was only 5%. And this road was not constructed in complete compliance with the principles herein advocated.

In the past, one of the most common criticisms regarding the use of soil as a building material, has been that it is unreliable in its behavior under tests. The data compiled by this research engineer, however, have shown repeatedly that when a structure is created in a certain type clay soil and the methods of setting-up and testing are constant, the results are constant if the soil structure is not ruptured; also, that when planned variations in the method of setting up the tests are employed, the results vary in a regular manner.

The stress-strain data, illustrated in Fig. 1, show definitely that the ratio of stress (the applied load in lb. per sq. in. of end area) to strain (the vertical deflection of test cylinder in fraction of an inch per one inch of cylinder height) is constant up to a certain point, and then the unit-strain increases in a faster ratio than the unit-stress, until complete rupture of the soil is reached. This point of change in ratio is commonly known as the *elastic limit* of the material.

The curves in Fig. 2 are based on 30% moisture content test cylinders. They show the relatively low compressive strengths and elastic limits at various numbers of unit compacting force. They also show that the soil, at this water content, can be weakened by more units of compacting force than the "optimum" for that density-moisture combination.

These curves show that the 20% moisture content cylinders were much stronger, that they too, could be ruptured by excess compaction, thus weakening their compressive strength. The "optimum compaction" for the



★ Figure 3

20% water-content-density combination soils is nearly four times as great, at the elastic limit, as that for 30% water-content-density combination soils. However, principally, these curves show the elastic limits for increased compaction effort up to the "optimum."

What Working Stresses?

Knowing these facts, what working unit-stresses should be adopted for soil structures? In discussing this, two fundamental rules must be kept in mind:

1. Working unit stresses should be established at values less than the elastic limit of the material, and
2. Working unit-stresses should be smaller for sudden loads than for static loads.

The bridge division of one highway

department (and probably the average) designs steel structures with a working unit-stress of 54% of the elastic limit of the material used. The other 46% is allowed to take care of deterioration, imperfections, temperature fluctuations, secondary stresses, future increase in live load, and fatigue. For compacted clay soil substructures, it appears, that for the present, the working unit-stress should be not greater than 50% of the elastic limit at the time compaction is completed and the superstructure is placed thereon. The other 50% or more should be allowed as a factor of safety, principally for imperfections in construction, subsequent increase in moisture content not practicable to prevent, future increase in live load, vibration, impact and fatigue.

One of the major problems in soils

mechanics work of the past has been the matter of accurately determining the load carrying capacity of compacted soils, in the laboratory and also in the field. Presently employed methods of punching or by loading a bearing plate until the soil is penetrated or deflected to a more or less arbitrarily established amount, has been found to be not wholly satisfactory in many instances.

Correlating Field and Laboratory Compacting

Since the elastic limit of a compacted clay soil can be determined in a practical way in the laboratory, with standard compression testing machines fitted with an extensometer, the problem of making this determination in the field is merely one of transferring this procedure to portable field-type equipment and correlating the procedures. The procedure is as simple as determining the amount of compacting force (rolling, for instance) to apply in the field that will produce a compressive strength equal to that produced in the laboratory with a certain soil moisture content. It appears that this can be done by determining the elastic limit of the soil from time to time while it is being compacted in place in the substructure, laboratory and field data having previously been correlated.

For illustration, consider the data of the soil in Fig. 3 with 23% moisture when compacted with 375 laboratory rammer blows of units of compaction. The elastic limit is 112 psi. When the soils engineer on construction thinks a layer of soil has been compacted sufficiently to bring it up to the elastic limit of 112 psi., he should start testing it, in practically the same way the data are taken in the laboratory, to determine the elastic limit. For this job he will use equipment similar to that shown by Fig. 4.

Elastic Limit Test Procedure

Where the sheepfoot roller is used, there usually will be some loose soil at the top of each layer, which should be removed down to the well compacted condition. The top of the compacted soil should then be made level and as smooth as possible, for seating the bearing plate. Loading then should be applied to the bearing plate gradually and the extensometer reading recorded at each 50 lb. increment of total load applied until at least 112 psi. is reached. The data, when plotted on cross section paper similar to Figs. 2 and 3, will show the elastic limit of that compacted soil. The plotted line should be straight from the beginning of loading up to

the elastic limit. If it is not, the soil has not been compacted enough. Rolling or compaction effort should be continued until the desired elastic limit is reached. This procedure should be repeated on every layer of soil, on scattered places, until the proper elevation or top of substructure is reached.

From the above discussion and from tests which support this concept, the following conclusions are derived.

Design to Keep Water Out

From the above conclusions it is apparent that keeping the water out of a clay soil substructure is most important. Rain, seepage, and a high ground water level are the three principal sources of detrimental water. Rain and seepage get into the substructure by gravity, while ground water reaches it by capillarity and temperature fluctuations of the mass. There are several preventive measures that can be taken to protect the consolidated substructure.

Rain water can be held out by methods previously mentioned and by completely covering the top of the consolidated soil with an impervious membrane.

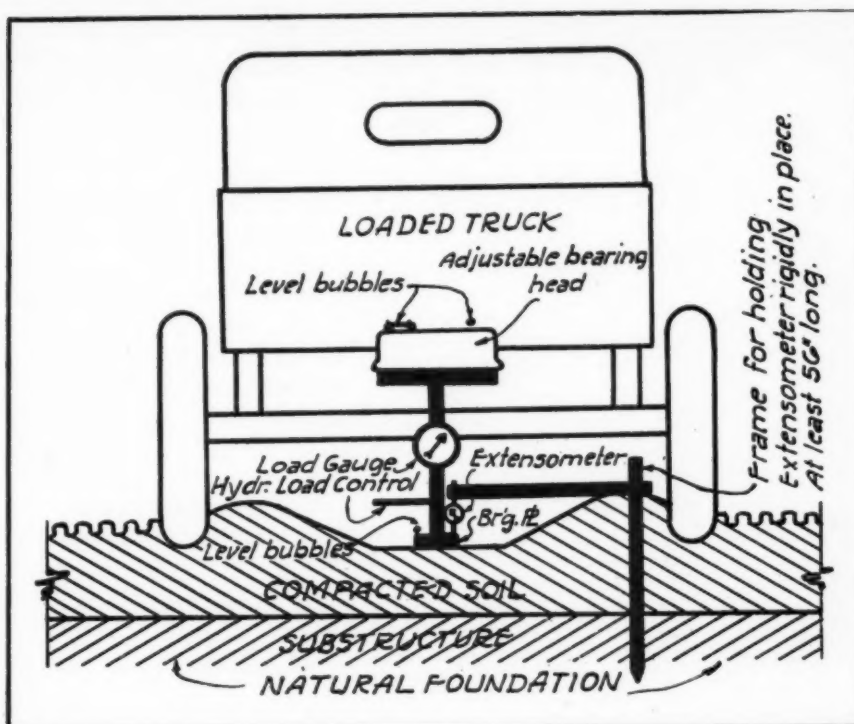
Seep water can be intercepted by proper surface and subsurface drains. Locations of these elements require studies of local conditions on the site.

Ground water is the toughest enemy and, to my way of thinking, the most difficult to handle. The capillary action will have to be destroyed. It can be done by:

1. Efficient sub-drains located so as to lower the water table.

2. Construction of a cut-off between the natural ground and the consolidated soil structure, either by means of a waterproof membrane on top of the natural soil, or by placement of a layer of gravel or other coarse material that will break up the capillary action (see Fig. 5).

The treatment will depend upon conditions. That procedure which might be most economical and efficient at one place may not be so, or be applicable at another place. Furthermore, it must be recognized that investigations made during a dry season might not indicate conditions to be found during a wet season, particularly so far as ground water is concerned or possible appearance of seep water. Protective measures should be taken in all cases where there is any possibility of seepage or capillary water getting into the consolidated soil. After the compacted soil has been ruptured because of admission of excess water, or because of overloading, repairs are always expensive and never satisfactory.



★ Fig. 4. General principles of field equipment for making elastic limit tests

Conclusions

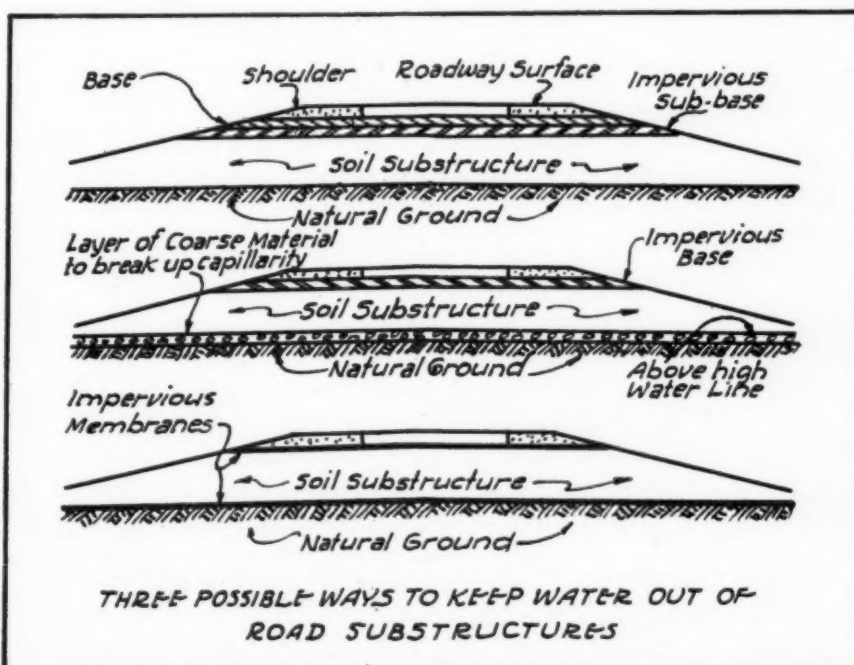
1. There is no doubt that in order to obtain satisfactory results from roadway substructures built of clay soils, compacted integral structures of known characteristics first must be created in the soil, with sufficient compressive strength to continuously support imposed maximum loads without detrimental vertical deformation. These requisites are no different from those for satisfactory service from all

other building materials now in use.

2. Carefully performed laboratory tests on compacted clay soil cylinders, where their structures are not damaged, produce very regular and uniform data that can be reproduced easily and coordinated.

3. There is no doubt that, within certain limits, reducing the moisture content of clay soil and increasing the compacting force applied, in-

(Continued on page 120)



★ Fig. 5. Three ways to keep water out of a road substructure

Drainage Fundamentals

Well Stated in this Maintenance Manual

A concise summary of what a maintenance foreman and his crew need to remember about drainage needs and practice, as included in the Maintenance Manual of the West Virginia State Road Commission, E. L. Worthington, Commissioner

WATER is undoubtedly the arch enemy of road builders, and the only effective means of combatting this enemy is by installing and maintaining proper drainage facilities. Too much emphasis can never be placed upon this fact.

The truth of these statements is borne out by the fact that most well compacted soils, when dry, or rather at optimum moisture content will, if protected from abrasion, carry traffic without displacement.

It follows that the proper design

of a drainage system and pavement section for any road is a compromise between, (1) spending money for adequate drainage, or, (2) spending it for thicker pavement surfaces.

The more nearly the compacted subgrade is waterproofed from above and below, the more stable it will remain in all weather, and the thinner the pavement section necessary. Conversely, as more water is permitted to enter the subgrade the more stability is lost, and the strength of the pavement must be increased to distribute the traffic loads to a larger area of subgrade.

There is universal agreement among highway men that drainage is the most important factor in reducing maintenance costs, but for some unknown reason more money is spent each year correcting the effect, rather than the cause of bad drainage.

Spring after spring, the same section of pavement is either repaired or partially replaced without any attempt being made to ascertain or correct the cause of the breakup.

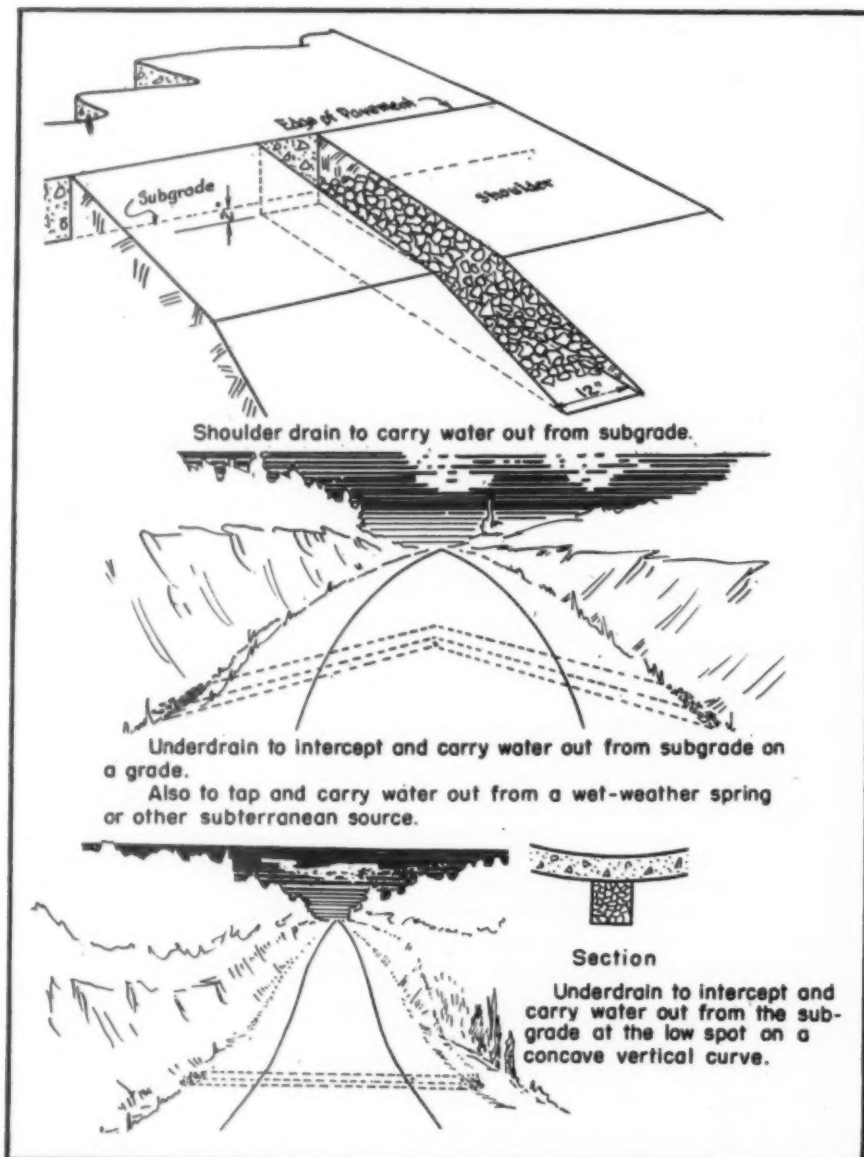
The old adage, "An ounce of prevention is worth a pound of cure," is always applicable to road and bridge drainage problems, and maintenance men must be "drainage conscious" at all times.

ROAD DRAINAGE

The problems pertaining to the drainage of roads are classified as: Subgrade Drainage, Base and Pavement Drainage, Shoulder Drainage, Side Ditch Drainage, Cut Slope Drainage, Fill Slope Drainage, Cut-Fill Point Drainage, Slide and Slip Drainage, and Side Road Drainage, and they are outlined as follows:

Subgrade Drainage

The subgrade is the foundation upon which the road is constructed; therefore, it must have both initial



★ Fig. 1. Shoulder and underdrains

and permanent stability if it is to continue to carry the loads which will necessarily be superimposed upon it.

If the subgrade soil, at the outset, has a tendency to absorb moisture too readily, either the source of the excess moisture must be found and the water diverted from the subgrade, or the soil must be replaced with selected material of high porosity, in order that any accumulation of water will drain away quickly, and in order that capillary action will be disrupted.

The two foregoing precautions are new-construction details, and as they were neglected during much of the earlier construction of pavements, the present problem is to counteract the absence of these essential features.

This may be accomplished with varying degrees of success by giving particular attention to the maintenance of proper Side Ditches, the installation of Under-Drains and Interceptor Drains, and by Subgrade Treatment to (1) drain subgrade free water away quickly, and (2) to disrupt capillary action.

Details pertaining to the above items are as follows:

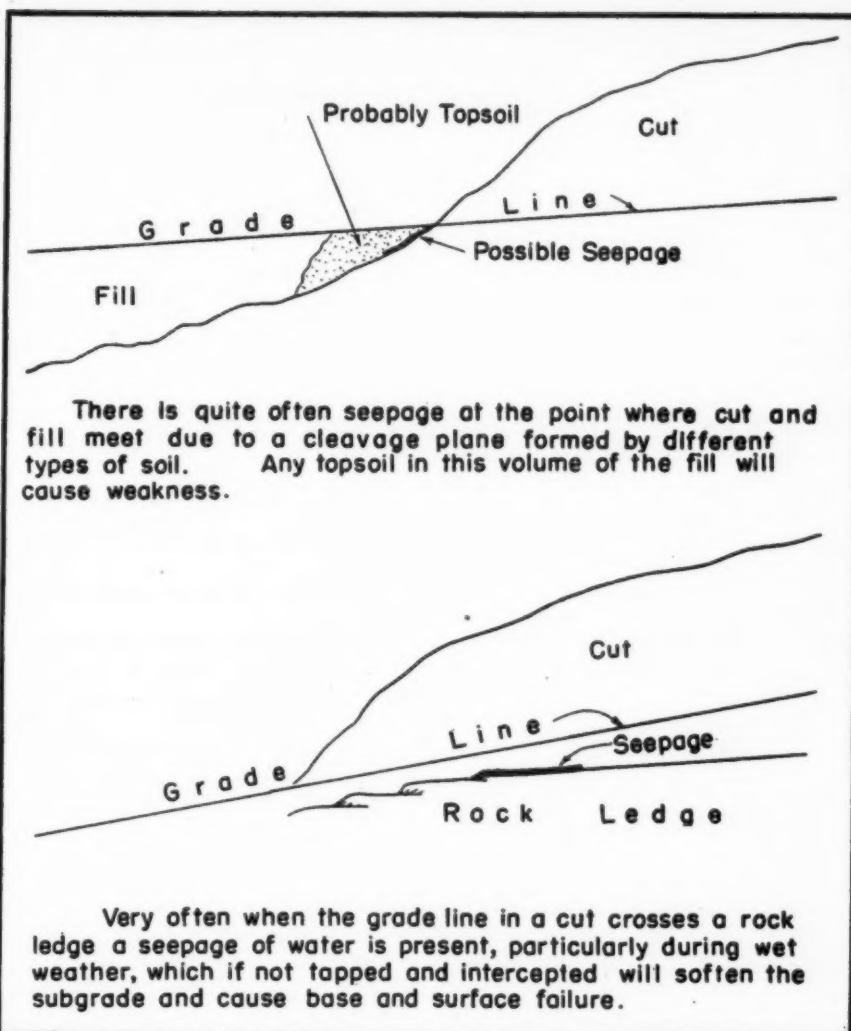
1. **Side Ditches** should be kept low enough to keep the water table below the subgrade elevation. This is particularly important where the grade of the road is level or near level.

2. **Under-Drains** either French or perforated pipe, should be installed at every point where there is evidence of excessive water in the subgrade. (See Figs 1 and 5 of typical under-drains.)

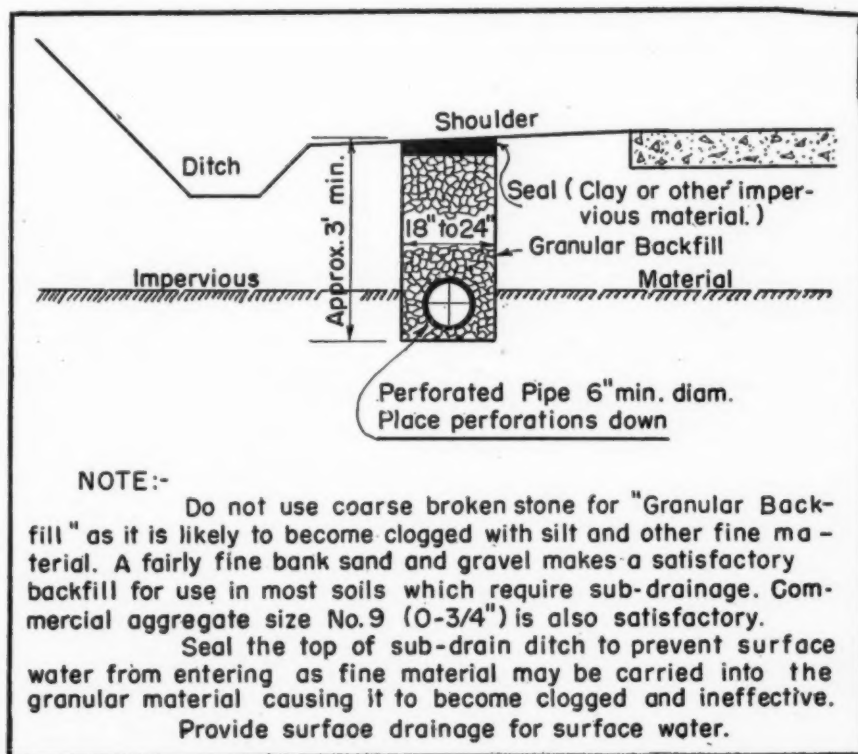
Under-drains should be placed also at the low point in all concave vertical curves, regardless of whether cut or fill sections are involved. (See Fig. 1.)

Other danger spots are (a) the point where the grade line in a cut crosses a rock ledge on top of which there is quite frequently continued seepage (see Fig. 2) (b) the point where the cut stops and the fill begins, because there is often a cleavage plane here due to incompatibility of different types of soil, which can be conducive to a seepage of water, (c) where blasting operations have left pockets for the accumulation of water in rock cuts.

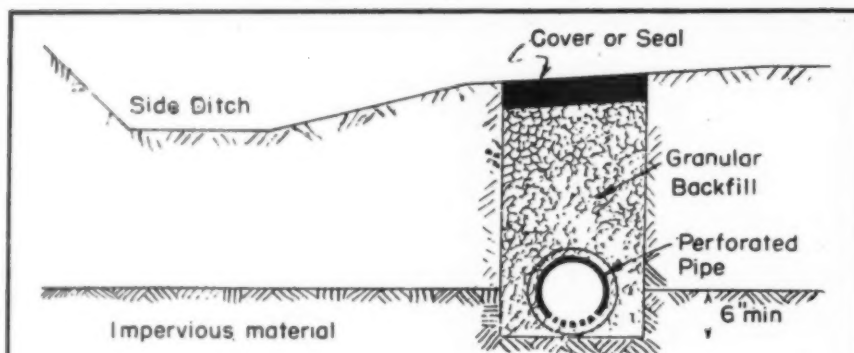
In other instances wet weather springs caused by a head which may be entirely away from the road will furnish a flow of water to soften and thus reduce the carrying capacity of the subgrade. The water from such springs can sometimes be diverted



★ Figs. 2 and 3. Two examples of seepage which affect subgrade



★ Fig. 4. Detail of standard interceptor underdrain



Sketch showing typical French Drain and typical Underdrain (The two types are identical with the exception that the French Drain does not have the perforated pipe.)

The depth of the drains varies to suit installation conditions; however where it is at all practical, the bottom of the drain should be below the frost line, and in impervious material for a depth of at least six inches (6").

The granular backfill should be made with No 9 aggregate (0 to 3/4") using gravel, limestone or slag without dust

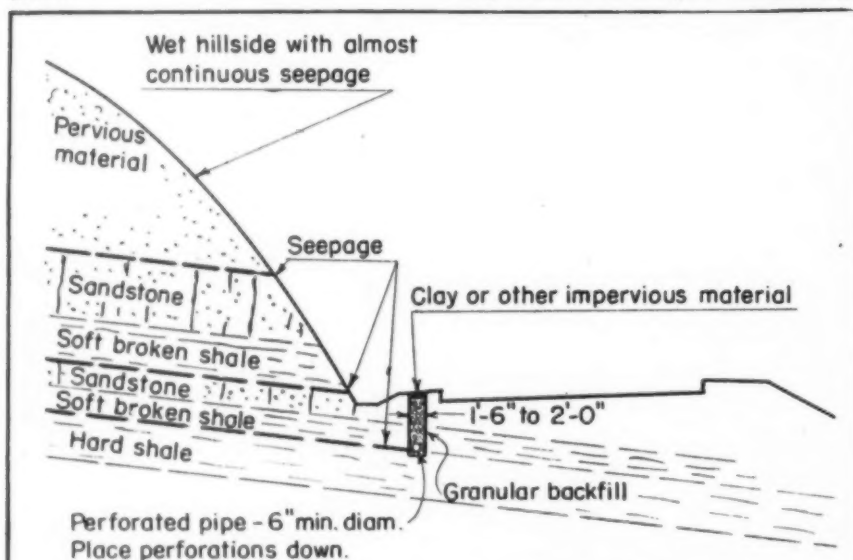
The practice has been to use larger size knapped or crushed stone for the backfilling of these drains, but this practice is to be discontinued, as the voids in the larger aggregate become clogged too easily

The 4" cover or seal should be clay or other impervious material

The 6" perforated pipe should be installed with the perforations down, because when the perforations are up, the little holes are more likely to become stopped up, and furthermore the pipe being usually on a light grade is more likely to become stopped up with any material entering the perforations

before reaching the subgrade. If possible, this is preferable; but if not, then the only solution is to tap the spring with a good under-drain to carry the water away from the subgrade.

3. **Interceptor Drains** should be placed in the shoulder parallel to the center line and between the side ditch and the edge of the subgrade to intercept and carry out to the ends of the cuts any water which seeps or filters down



Sketch showing installation of Interceptor Drain to prevent water from wet cut slope reaching and softening subgrade.

This drainage problem occurs more frequently in side hill cuts than in through cuts; however there are cases in which a drain is needed on both sides of the road.

The ditch for the drain may be excavated economically with a ditching machine, a trench hoe, or a small power shovel.

★ Fig. 5. French and underdrains

from wet cut slopes, or which seeps in from water bearing strata, wet weather springs or swampy areas outside the ditch line. (See Figs. 4 and 6 for sketches of a typical interceptor drain installation.)

The use of these interceptor drains is highly recommended, as they are very effective.

4. **Subgrade Treatment** involves the replacement of certain portions of the existing soil with a well compacted, selected material of a granular nature to expedite drainage and to disrupt capillary action.

As West Virginia is located between the North and the South, winter climatic conditions are conducive to alternate freezing and thawing, estimated at about 50 cycles per year, resulting in probably the worst condition to which a subgrade is subjected, because there is either an excess of free water to cause instability, or the building up of ice lenses to cause heaving.

This alternate recurrence of a condition which first removes support from a pavement, allowing it to depress under traffic, and then applies a force to heave it in the opposite direction, subjects the pavement to a bending which can only result in ultimate failure, if not corrected.

The following is to give some idea of how freezing affects the subgrade, and the types of soil conducive to capillary action:

Water expands when it freezes, increasing in volume about nine per cent (9%). Freezing and thawing of a subgrade soil having a normal or optimum moisture content slightly loosens the soil in the subgrade, but, if only the normal moisture is present, the increase in volume will not be sufficient to affect seriously the stability of the subgrade or to cause appreciable heaving. On the other hand, if the subgrade soil is of a highly capillary nature, for example a silt or silty loam, and the water table is high enough that any portion of the capillary fringe is within the frost zone, water from the capillary fringe is attracted to the ice crystals formed by the initial freezing. This water is in turn frozen and replaced by water carried up from the water table, which is in its turn attracted and frozen. In this manner are formed ice lenses which heave the subgrade and the pavement.

Later the ice lenses thus formed

★ Fig. 6. Use of interceptor drain to effect subgrade drainage

thaw, releasing free water which mixes with the soil, softening it and causing an unstable condition, removing support from the pavement.

Tests have shown that some silt soils will carry capillary water upward about eleven feet. Clay soils being composed of much smaller particles than silt soils, should theoretically raise capillary water correspondingly higher; however, the capillary tubes in clay soils are so small that friction is increased to such an extent that the amount of water delivered to a given elevation above the water table is not nearly as great as that delivered by a silt soil. For this reason a clay soil has a much lower susceptibility to frost heave than a silty soil.

A cohesionless, sandy soil has a very small capillary rise and is unlikely to be affected by frost.

When soils having a capillary rise of several feet are encountered, it is frequently impractical to lower the water table enough, with side ditches and under-drains, to prevent frost heave and frost boils (which are merely frost heaves having small horizontal dimensions). In such instances it is necessary to place a blanket of granular, non-capillary material of sufficient thickness to provide insulation and prevent the highly capillary subgrade soil from freezing. Care must be exercised to provide free drainage of this granular blanket, otherwise, it will form a reservoir for free water and will do more harm than good.

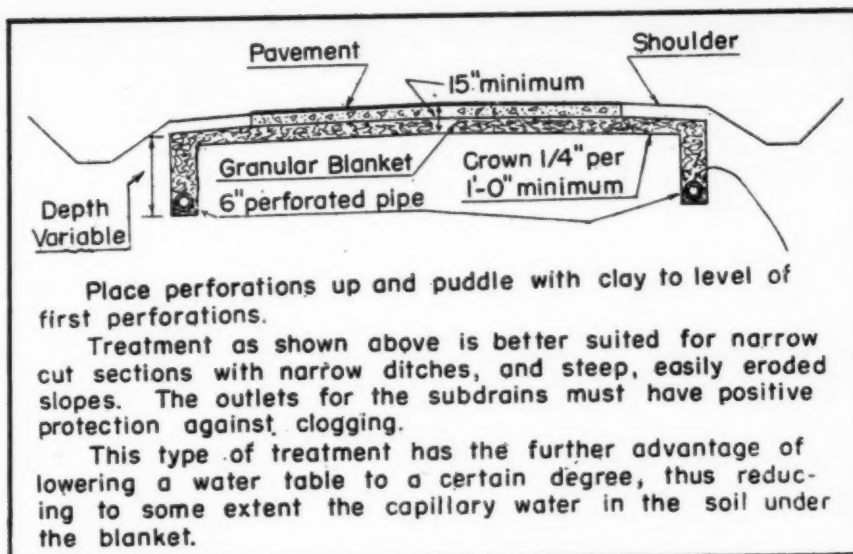
Fig. 7 shows methods of placing and draining granular blankets placed to prevent frost heaves and for subgrade stabilization.

Only that portion of ground water referred to as free or gravitational water can be removed by drainage. In some cases a subgrade soil that has been saturated, either by capillary water being carried upward from the water table by capillary action, or by transverse flow of ground water, will retain a sufficient amount of water, held by surface tension, to produce instability even after the installation of under-drains which lower the water table or intercept lateral flow.

Placing a pavement over such a section of subgrade provides an effective seal which prevents evaporation of the surplus moisture, with the result that the subgrade may remain unstable for a long period of time, causing repeated pavement failures.

Correction of this condition can be effected by the following methods:

(a) Break up or remove all the pavement over the affected area, and maintain the surface with some type



★ Fig. 7. Under drainage for wet sections



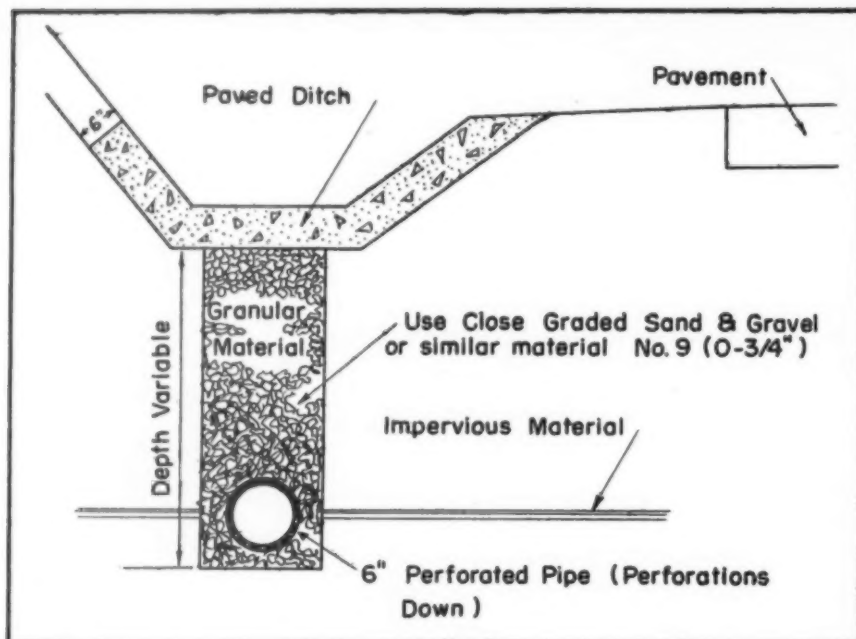
★ Fig. 8. Ditch and shoulder paving

of traffic bound material for a sufficient length of time to permit the evaporation of the excess moisture. Then replace the pavement after the subgrade has become stable.

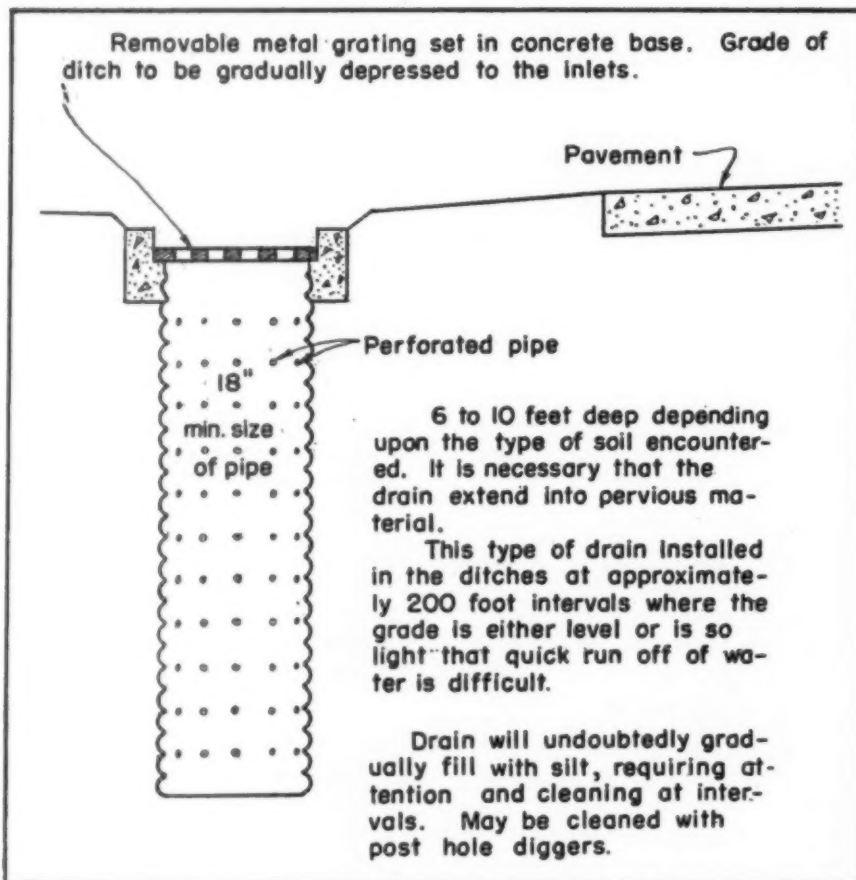
(b) Repave the affected area with a pavement having sufficient structural strength to distribute the traffic load to an area of the subgrade sufficient in size to provide stability.

(c) Patch the affected area of the

broken pavement to provide a seal which will prevent moisture escaping upward through breaks and cracks. Then place a cushion of thoroughly compacted soil over the old pavement sufficient in thickness to distribute the loads to an area large enough to bear safely the loads without displacement. A cushion 18 in. thick is usually enough to provide the necessary load distribution. Then place a



★ Fig. 9. Underdrain for paved ditches



★ Fig. 10. Leaching drain for level or light grades

suitable type of pavement on the soil blanket.

The first method noted is usually preferable unless the traffic is too heavy to permit the temporary maintenance with traffic bound material.

In case the second method is adopt-

ed and the affected area is paved with a flexible type such as macadam, a compacted insulation course of stone or slag screenings 1½ in. thick should be placed on the subgrade to prevent the unstable soil from being forced up into the voids in the macadam base course.

Base and Pavement Drainage

The methods used to drain the subgrade will also serve in draining the base and the pavement; however, additional French drains should be installed through the shoulders at intervals to carry out to the side ditches or slopes any water which drains on the subgrade, especially at the edge of the base.

The trench for these drains should be excavated at least 2 in. below the top of the subgrade, and should be given ample fall out toward the ditch or slope in order to draw the water out as quickly as possible. (See Fig. 1.)

Such shoulder drains are very often installed during construction, but become filled up, making it necessary either to clean them out or replace them.

Shoulder Drainage

The drainage of the shoulders is, as a rule, adequately taken care of by keeping the surface of the shoulder properly sloped and smoothed. The installation of the shoulder drains mentioned above also assists in the shoulder drainage.

Side Ditch Drainage

The side ditches should be deep enough to keep the water table as low as possible. This is particularly necessary on flat grades. On steep grades where an easily erodible material exists, side ditches should be paved with stone or cement concrete to inhibit erosion, and under-drains should be provided to remove underground water and influent seepage from under paved ditches. (See Figs. 8 and 9.)

On flat and very light grades it is often difficult to make the side ditches drain, because there is not enough fall to make the water run to culverts or other disposal points. In such instances the difficulty can be overcome by installing Leaching Drains as shown in Fig. 10.

Cut Slope Drainage

Diversion ditches should be provided on all cut slopes where there is any chance of erosion, in order to divert the surface water from the old ground slope above, and thus prevent its washing down over the face of the slope. The growth of ground cover should be encouraged on cut slopes. (See sketch of typical diversion ditch, Fig. 11.)

Fill Slope Drainage

Care should be exercised to insure that no concentration of water is turned down over a fill slope unless a

★ Fig. 11. Diversion ditch for erosion control

paved spillway is provided to prevent erosion.

The growth of ground cover should be encouraged on fill slopes to add stability and to inhibit erosion.

Cut-Fill Point Drainage

At the point where the cut ends and the fill begins, water from the side ditches through the cut is turned out and usually flows down the slope at the junction of the old ground and the new fill, causing a bad wash; and also in some instances the water soaks into the fill, destroying the stability of the fill slope. Therefore, some means of inhibiting the erosive effect of this water and also to prevent its seaking into the fill should be exercised. A paved spillway will usually solve the problem.

Slide and Slip Drainage

The drainage of slides and slips is covered in the chapter on slides; however, it is not amiss to reiterate the fact that practically all slides and slips are due to lack of adequate drainage. Therefore, wherever there is any indication of a slide or slip, the first thing to look for is water, and the second thing is to intercept the water.

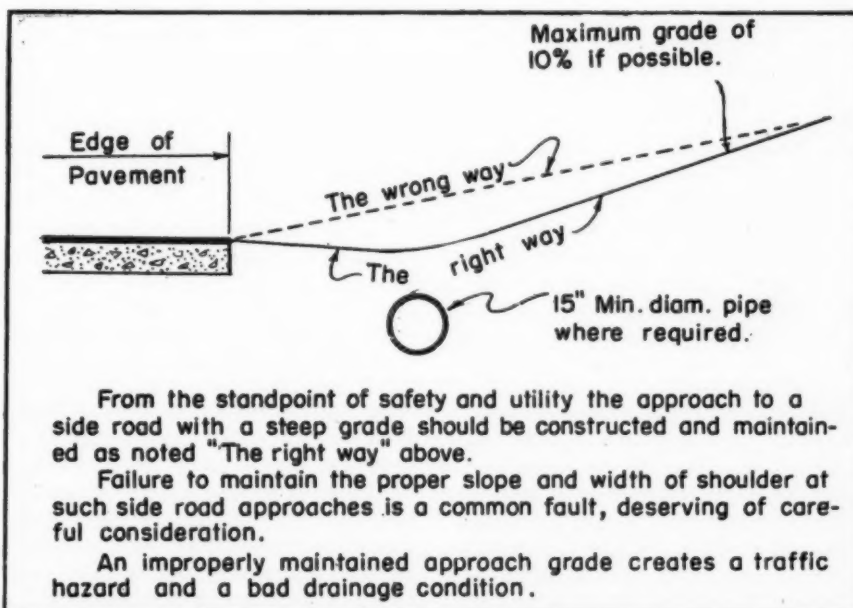
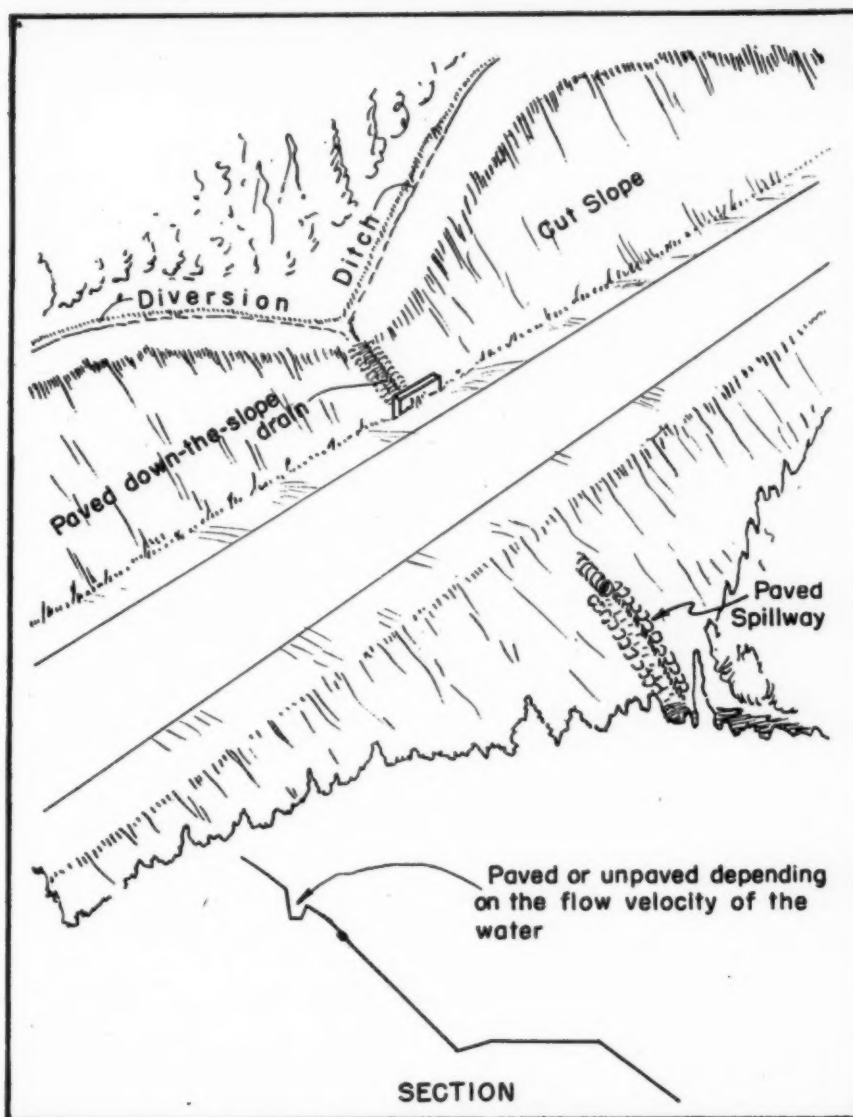
Side Road Drainage

Particular attention should be given to the drainage problem of side road intersections, because instances are very common in which material from side roads is washed out onto the shoulder and even the paved surface, creating a distinct hazard to travel as well as interfering with proper drainage.

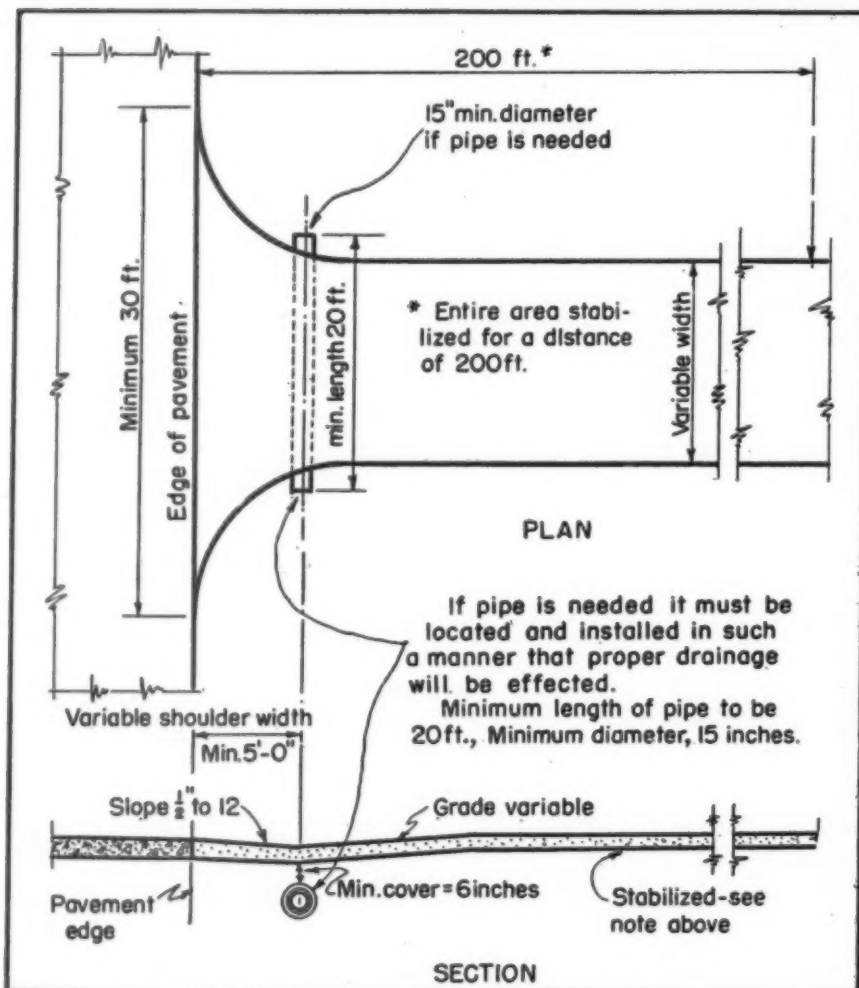
A depressed ditch section is preferable to a pipe culvert under side road intersections; however, quite frequently a pipe is necessary, and care should be exercised to see that it is properly installed, and of sufficient size. The minimum size should be 15 in. as a smaller pipe is too hard to keep open or to clean. Figs. 12 and 13 pertain to side road approaches. The grade of the approach road should be depressed at the ditch line in either event.

Culvert Drainage

Regardless of how good a pipe or box culvert is, it cannot function properly unless the water can get in and out without interference; therefore, inlet and outlet ditches merit special attention to insure that they are maintained in their original condition. Outlet ditches, particularly



★ Fig. 12. Side road approach with steep grade. The downward slope from the edge of the pavement should extend at least for the full shoulder width existing at the approach, and in no instance less than five feet



★ Fig. 13. Side road or private entrance approach

lation of water, or debris which retains moisture, exists on the bridge seats. The proper remedy is to provide adequate back walls to divert water around the ends of the bridge seats, and to prevent dirt from spilling on the bridge seat.

Expansion Joint Drainage

Care should be exercised to prevent water from running into and damaging expansion joints by carrying non-compressive foreign materials into joint.

Floor Drainage

It is important that the floor of a bridge be drained properly, and this may be effected by keeping the floor of the bridge properly crowned, free of low places which hold water, and by keeping the drains open. Floor drains should never be permitted to discharge on steel.

Arch Bridge Drainage

Many of the older types of multi-span earth-filled arch bridges present a definite drainage problem, because provision was not made to drain the water out of the natural low spots at the piers, or away from the joints between the arch rings.

Such bridges should be carefully observed at the piers and where there is any indication of leakage or seepage through the joints of the arch rings or at the point where the spandrel walls join the outside of the rings, it is evident that water is present and should be given a means of outlet. This can very often be effected by drilling holes near the piers through the arch rings or the spandrel walls in order to tap the accumulation of water and allow it to flow out. This is a more expensive method but is very effective, and in some instances is necessary to insure complete and adequate drainage.

from pipe culverts, are prone to become blocked with grass, weeds, or sediment, and require frequent attention.

When the intake end of a box culvert is too low, a condition which is rather prevalent, there is always a tendency for the opening to begin filling at the intake end, and for the filling to extend gradually through the box until the entire opening is blocked, resulting in an expensive cleaning job.

To correct this condition it is often possible to lower the inlet ditch. Straightening and lining up the inlet ditch helps in some instances. In other instances paving the inlet ditch will expedite the flow of water into a culvert. If none of these measures prove effective, then the only alternative is to change the location or grade of the culvert, otherwise recurrence of the filling may be expected, and over a period of years will result in maintenance costs in excess of the cost of changing the grade or location of the structure.

BRIDGE DRAINAGE

The problems pertaining to the drainage of bridges are classified as:

Abutment Drainage, Bridge Seat Drainage, Expansion Joint Drainage, Floor Drainage and Arch Bridge Drainage, and they are outlined as follows:

Abutment Drainage

It is important that drainage be provided through and around bridge abutments. Many of the older constructed abutments do not have waterproofing on the filled side to prevent water which accumulates behind the abutment from seeping through the abutment, particularly at construction joints. Therefore, wherever there is evidence of such seepage, steps should be taken to tap the source of the water and either divert it around the ends of the wings or drill weep holes to carry water out through the wings or the abutment.

Where drains have been provided through the abutment, care should be exercised to see that these drains function properly. Sometimes this can be accomplished by running a bar or churn drill through the opening to remove obstructions.

Bridge Seat Drainage

It is very important that no accumu-

Mail Inserted Card for Equipment Data

Again this issue of *Roads and Streets* carries descriptions of many new labor-saving efficiency devices and latest material developments. See our *Postwar Parade* beginning on page 108 for which a numbered reply card has been inserted to help you request data on items that interest you.

Construction Inspectors Get One-Day Pre-Season Briefing

Connecticut highway department meeting covers many practical subjects in series of short, informal lectures by resident engineers and department heads

By D. T. Robinson

Junior Highway Engineer,
Connecticut State Highway Department

THE vital importance of good inspection and the need for inspectors to be on their toes on a wide variety of matters were spotlighted during a one-day meeting held at Hartford in March by the Connecticut state highway department.

The meeting was staged under the direction of L. G. Sumner, the department's director of engineering, with Raymond T. Healy, engineer of materials, and resident engineers from the five districts in charge.

Subjects included the various phases of highway design, inspection, changes in procedure, and pertinent specification alterations that might be encountered during the coming highway reconstruction and planning program.

E. B. Burdick, superintendent of bridges, discussed new concrete bridge construction from the maintainer's observations after construction. The principal points stressed were for durability and post-construction bridge operation and appearance. Mr. Burdick particularly brought to the inspectors' attention the fact that more care must be taken in the design and placing of deck drains and other appurtenances, the need for longer curing of concrete, attention to concrete forms and placing of the concrete mix, placing reinforcing steel, ornamental castings and the removal of temporary form braces and spreaders.

Mr. Healy pointed out the necessity for having accepted tests of all materials used, and the continued sampling and testing of materials at intervals during their use, so that a uniform quality of durable and acceptable construction could be maintained. The discussion covered the use of air-entraining agents in the newer concrete mixes, and their control, which was particularly inter-

esting to the inspectors who have not encountered this method of increasing the workability of the concrete mix. The laboratory's procedure for pre-mixed asphaltic materials was explained, and the proposed method of control was presented to the group for their information. The engineer of materials invited the field forces to make the continued use of the laboratory, not only for policing materials, but as an information and experimental agency willing to aid any particular job or project problem that might occur during construction.

Comments by various resident engineers are as follows:

W. T. Schuler gave a resume of bituminous macadam pavement practice, particularly penetration macadam. This topic was explained, from the shaping of the subbase, through the spreading, rolling and application of the filler, preparation of the base course for the penetrated surface course, the spreading of the stone for the surface course, and the methods of application and control of the bituminous materials for the penetration and seal courses, and discussed in detail, and the difficulties that might be expected to be encountered and the preventative and correcting procedure to obtain a uniform surface.

L. H. Beebe spoke on concrete pavement and the inspectors' responsibilities and precautions that should be taken to obtain a pavement of quality and durability. He explained detailed steps for the inspector and his assistants to follow to keep the paving project under control and well supervised at all stages of construction, from the reception of the raw materials or aggregates to the completed and cured pavement.

Mr. Edward S. Lawler highlighted on excavation and grading, the grading inspectors' responsibility to allocate the available excavation material to the most suitable embankments, methods of forming the embank-

ment to obtain the most stable and firm section in the fills. Mr. Lawler mentioned the reluctance of contractor superintendents to bring slope lines to the templates on the cross sections in an effort to avoid wasting the borrow material outside the pavement area. This practice should be avoided, even to the extent that the pay lines for the embankment sections be extended to include any outside material, within reason, so that the fill section of the roadway would have full compaction and would not endanger the pavement metal from being undercut because of unstable embankment. The amount of allowable fattening of the fill should be as carefully controlled by the grading inspector as a major structure would be during its erection.

Mr. Lawler further discussed the use of stable and unstable materials, and explained that if the engineer on the project was in any doubt as to the character of the material from any cut or borrow bank, tests should be conducted by the soil engineer from the testing laboratory, and his advice taken as to the use or rejection of the questionable material.

F. W. Disbrow discussed the town and unimproved roads program. He stressed the importance of good line, profile and adequate drainage on these secondary, or lower types of roadway, and the economical expenditure of the funds to obtain the greatest mileage of good, usable pavement for the least cost.

Walter M. Jones spoke on the subject of "Culverts, Drainage, etc." Mr. Jones, in his talk, stressed the importance of good drainage, methods of design, past and modern methods of obtaining a well-drained and easily maintained roadway. The speaker gave examples of standard and special drainage problems on the several types of projects as encountered through his past experiences and substantiated by the authorities on highway drainage.

Ironing Out Wrinkles in Specifications

This well-known contractor leader bemoans tendency to specify construction methods as well as results. Calls for clearer specifications and makes other constructive recommendations that should help get more highway construction per dollar

By Roy A. MacGregor

Executive Secretary, Contractors
Association of Western Pennsylvania,
Pittsburgh

There has been a growing tendency during the last decade on the part of those responsible for the preparation of plans and specifications to depart from the original intent of expressing what is to be built, that is the structure or whatever it is to be as to design and the material to be used, for we now find this has been expanded to include what is to be used to build it with, that is the equipment to be used, and then again the methods to be followed to build it, that is methods, plans, and practices to be used in the building of it.

I think this is the beginning and the foundation of what I feel is a mess that the specifications have gotten into, and it is this that robs the reliable, skilled contractor of his initiative and ingenuity in doing his work and encroaches on the prerogatives which are rightly his in his business and profession.

Later on I will try to show that specifications that provide the methods to be followed are an encouragement to firms not familiar with the work to enter the field and in many instances influence unskilled and even unreliable contractors to file unintelligent bids which demoralize the market for reliable firms who know their business.

My contention is, that as a contractor I can be required to drive a specified nail, into a specified place, to a specified penetration by a special time. How I drive that nail, what I use to drive the nail with, and when I drive it is my business and my business alone. If I want to drive it with a tack hammer or a claw hammer, a ball-peen hammer or a sledge hammer, it should not be the concern of



him who had given me the job. His interest, as stated before, is the size of the nail, the location where driven, the depth to which it is driven, and the time in which it is to be finished.

It is this attempt to tell me how, with what, and when, that are making our specifications today confusing, ambiguous and subject to various interpretations, unreasonable, impractical, often unfair and in many instances really illegal.

Then again after we have gone through page after page to find out just what we are supposed to have bought, we find such words as "approved by," "to the satisfaction of," "acceptable to," "as directed," "prescribed" and "by the Engineer" which indicates that after all we really do not know up until the time of doing it just what we will have to do after all.

The other day I was looking over a set of specifications as they were used in 1936 which contained 310 pages. The same specifications five years later (in 1941) contained 440 pages, an increase of 42 per cent, and I feel sure that the quality of work furnished in the later years was no

better than that furnished earlier. In fact one of the best jobs of this type ever built in our area, as shown by its condition today, was built in 1925 and is still in better shape than jobs built ten years later.

Specifications develop like laws. Some unlooked for thing happens and while it may never or seldom happen again, a specification must be written to cover it. An unprincipled contractor puts over some slick trick and right away a hundred self-respecting reliable contractors must be hog-tied because he did it. It would be better to burn the offender up with close inspection and make him sick of the business, instead of this practice of writing another section, paragraph, or clause to the specifications. It is this that has put specifications into the class of the Encyclopedia Britannica, and it is a safe bet that no living soul has on the end of his tongue all that they contain for any one class of work.

A number of years ago an argument developed between an Inspector and his Engineer, a Contractor and a Ready-Mixed Concrete Company that was furnishing concrete to the Contractor. As I had sold the Truck-Mixers being used I was appealed to to help straighten out the matter. I went to Headquarters and to the Engineer who had written the specifications and asked what was intended when he wrote these specifications. I pointed out to him that he had written it, turned it over to the Chief Engineer, who in turn had given it to the Chief Construction Engineer, who had sent it to the District Engineer, who gave it to his Construction Engineer, who gave it to the Field Engineer, who told the Job Engineer to tell the Inspector what it meant, and I was satisfied that none of them knew what he had intended in the first place. He asked me what was happening and was very much disgusted

when I told him. He told me to go home and he would take care of it and he did—by long distance phone before I could get back, and the trouble was that he was trying to tell everyone how to mix good concrete in a Truck-Mixer rather than tell the kind of concrete he wanted, and like gossip each interpretation grew with the man making it.

Recently there came to my attention a specification that required one inch lumber for the lining of wall forms and an Inspector had insisted that one inch commercial lumber was not one inch lumber and required that one and one-quarter inch lumber be bought and surfaced to one inch.

Again, I have known where specifications covering columns limited the pour to three feet of column, and the Contractor was forced to accept two-yard batches of Ready Mixed Concrete on a twenty-mile haul where the capacity of the Truck-Mixers were two and one-half yards, because two and one-half yards poured a little more than three feet.

Now you may say these things are ridiculous and are exceptional cases, but I know that there are hundreds of similar cases that develop arguments, coming up all the time and most of them come from the attempt to write into the specifications the methods to be used in doing the work.

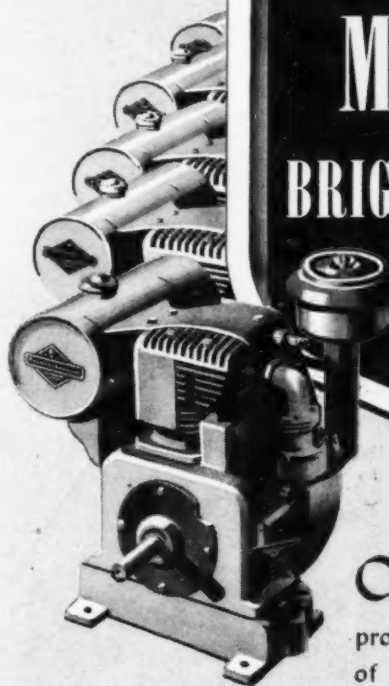
In the matter of forms, why should a contractor be told how to build his forms and what material and sizes of lumber he should use. This is his prerogative and if he gives the result he is paid to give, it is his business how he does it.

When specifications are written detailing the methods to be used in work, it becomes an attempt to write a text-book on Construction which places a burden on the Job Engineer and Inspector to see and show the Contractor how to carry out the methods in the specifications and thus they become teachers to the inexperienced, often unreliable, and usually unskilled Contractor and this develops unsatisfactory and ill-informed competition to the reliable, skilled, experienced firm.

Then again by establishing methods in the specifications, the real Contractor is robbed of his own initiative and ingenuity in doing the job and this blocks the Public from getting the best for its money. Those writing the specifications hardly ever have the knowledge and the experience of the reliable, successful firms who do such work every day, and they are not in a position to prescribe the best methods for every job.

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present day specifications all along the line are making the work cost the Public more than it should, and I think that it is time that Contractors refuse to be a party to this extra cost which is not necessary. Up until now, Contractors have taken these encroachments on their work lying down and it is high time they resisted them, as they are really a reflection on their ability to do the work at the lowest possible cost with reasonable profit to themselves and they should not be a party to a cost to the Public (which pays the bill) one cent higher than it can be.

In an article in the November issue of **ROADS AND STREETS** under the title "Improving Engineer-Contractor Relationships" H. K. Glidden, then Asst. Superintendent of Airways, First Region, Civil Aeronautics Administration, New York, N. Y., has written a most timely article along these lines.

In quoting excerpts from this article, Mr. Glidden says:

"Looking back over twenty years of work, almost all of which involved direct contact with contractors, I can, appreciate that, for the most part, engineer-contractor relationships are not what they should be by all means. The status of these relations, as well as the possibilities of improving them, have been discussed by the writer on numerous occasions with contractors and their representatives. These discussions and subsequent thoughts on the subject stem largely from the fact that as my duties and responsibilities increased and became more administrative, I realized that this relationship accounted for most of the serious difficulties I encountered.

"From all these contacts, I know full well that the majority of contractors are well meaning individuals who take pride in performing good work, but that a less admirable description applies to an appreciable percentage. Some of these less admirable, I feel, were just naturally born that way and that there is nothing short of economic disaster to them that will change their habits or occupation.

"I have found engineers fairly consistent in makeup, habits, intentions and characteristics, but ranging in qualifications from poor to excellent and I firmly believe that most of their poor relationships with contractors could be avoided by proper action on their part. This belief is borne out by the results obtained by certain engineering organizations as compared to that of other groups engaged in identical activities.

"As an illustration, I know of several engineering offices enjoying a reputation for fair dealing and good engineering. This reputation results in their securing very fair contract prices and brings to these engineers the respect and confidence of the contractors. Their engineer-contractor relationships are uniformly good. Other offices I know of enjoy the opposite reputation, resulting in the contractors, of necessity, concealing in their bid some amount to cover the cost of anticipated trouble.

"When two groups of people I have described come in contact with each other on the job, that is where the fun begins. Their relations with each other may be either a battle, a game of wits, a demonstration of power used for selfish purposes, or an exhibition of what can be accomplished by wholehearted, intelligent cooperation. It is to be regretted that wholehearted, intelligent cooperation is the exception rather than the rule. A good clean battle, or the matching of wits, will more often than not result in the owner, who actually employs both parties, receiving at least what he expected to get, although the contractor may get burned a little in the process. Most specifications afford an opportunity for the engineer to be vindictive and to exercise a great deal of power over the contractor. Conversely, many specifications have enough loop-

holes in them to allow the contractor to place the engineer in a tough spot. Ambiguous specifications put both the contractor and the engineer in a difficult position, and make for arguments, with resulting poor contractor-engineer relationships.

Of course, in the matter of specifications we also have the matter of interpretation to contend with, and when the specifications are written in ambiguous terms we need competent men, thoroughly familiar with the work, in charge of inspection.

Too often these men charged with inspection are far from being competent and must cover up their lack of ability by argument and bluster.

There is no question but that contractors spend millions of dollars annually, that are not required by the specifications, to meet the whims of inspectors in order to avoid argument and the displeasure of the inspectors, and this is of course passed along to the public in the bid.

Much of this comes from wages paid inspectors that are not high enough to attract good, competent men, and we should all be in favor of correcting this and the payment of wages that will provide fair-minded, intelligent men for us to deal with and we should do what we can to bring this about in our own interest as well as the Public's interest.

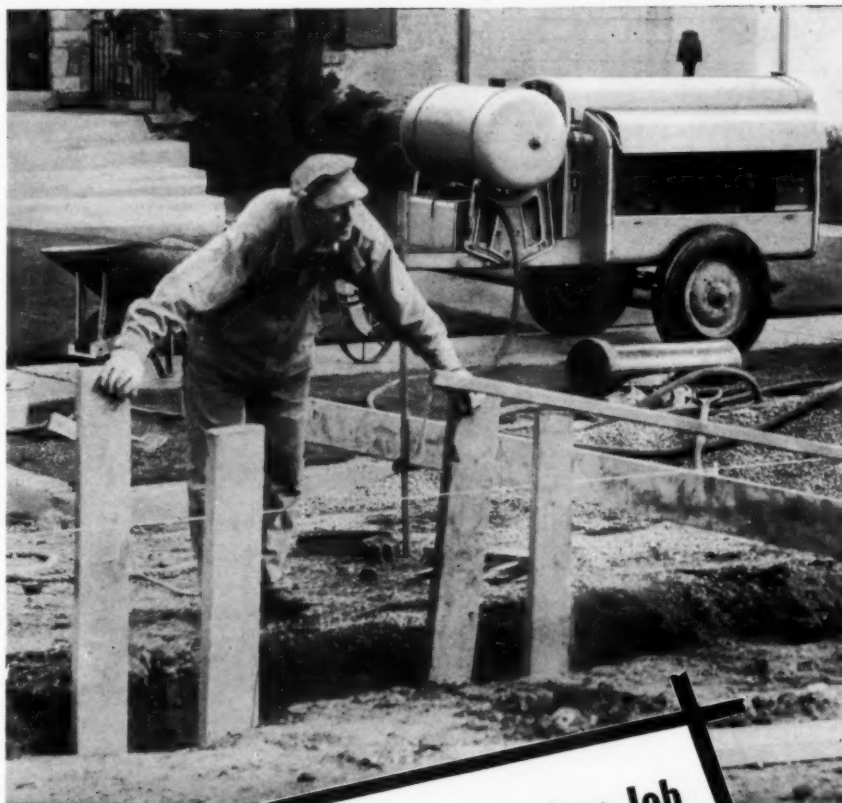
Again, as long as the same men draw the plans, make up the estimates for the appropriation, supervise the work and prepare the estimates for payment under loosely drawn ambiguous specifications we can look for a continuance of argument in the final settlement for the temptation to cover up one's mistakes regardless of whose ox is gored is a frailty of the human family.

A recent meeting of the State Highway Officials showed that there was an anxiety on the part of these men as to the stabilization of wages in connection with this work.

With the economic situation as it is in the country today, we should all realize that in all probability wages in this Industry will go up the same as they have done and are doing in other industries, and we in our area have been working for the past year to set up stabilized working conditions that would permit the work to be carried on without delay and interruptions.

While we can look for construction work to increase in cost, this cost can be materially influenced to compensate for this increased cost by writing clean, clear-cut specifications, free from loopholes and unexpressed requirements that cannot be put into the bid at the time of filing except as contingent items which all wise contractors are doing today.

If sufficient thought and effort are



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a spring-cushioned towing eye for smooth, high-speed towing.

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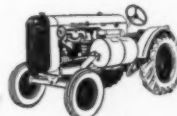
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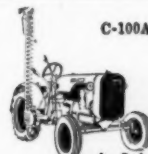
Le Roi heavy-duty engine



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Le Roi 105 Tractor



Le Roi Centaur Mower

C-100A

put into the preparation of fair, clear-cut specifications and they are then administered by competent men without fear or favor and in a common sense manner, there can be a lowering of costs that will partly compensate for increase in wages.

Here is a clause from a set of specifications which came to my attention recently:

"Any questions or disputes arising between the contractor and the Director respecting any matter pertaining to the contract, or any part thereof or any breach of non-performance of the Contract, or any extra work

claimed to have been done by the Contractor on the site of or in connection with the Improvement, shall be referred to the Commissioners, whose decision and award shall be final, binding and conclusive upon all parties without right of exception or appeal, and all right or rights of action at law or in equity or otherwise under or by virtue of the Contract and all matters connected with or relative to the Improvement are hereby expressly waived."

When this clause came to my attention my first feeling was that it was not legal as I did not believe that any

one had the right to waive rights that were guaranteed to him as a free born American Citizen.

However, after taking the matter up with three different legal departments connected with our membership, I have begun to think that a contractor is foolish to sign a contract embodying this clause and if he signs it he has no redress.

You will note this places the decision in the hands of the Awarding Authorities who can hardly be expected to be entirely free from bias in connection with any disputes that may arise. Would it not be better to provide for arbitration with disinterested parties sitting in in cases of this kind? It would at least be fair.

When we can get clear-cut plans and specifications free from dictation as to equipment and methods the public will get better work and undoubtedly at a lower cost with a fair profit to the contractor.

In closing, naturally we all want to know what we can do about it, and I make these suggestions:

First—The Associated General Contractors of America, Inc., can contact the American Society of Civil Engineering and the American Association of State Highway Officials for general help in pointing out the evils that have come into the preparing of specifications as brought out here and encourage ethics such as these as to the Engineer:

"a. He shall deal fairly with the contractor in all relationships.

"b. He shall, in his judicial position as an arbiter between an owner and a contractor, act with the highest ideals of fairness and honor.

"c. He shall conduct lettings fairly and openly, and in general, all bids shall be opened and read publicly in the presence of the bidders who desire to be present.

"d. He shall conduct all lettings fairly and openly, and in general all bids shall be opened in the presence of all who desire to be present.

"e. He shall promptly provide the contractors with such information and line and grade as necessary for the orderly carrying out of the project.

"f. He shall not require the contractor to furnish material or do the work not called for by the plans and specifications.

"g. He shall recognize that the preparation of preliminary estimates and similar data by a contractor involves expense and shall not make unnecessary demands for such items.

"h. He shall recognize that the preparation of formal estimates by a contractor involves expense and should not make unnecessary de-

MR. CONTRACTOR



It is your responsibility to control the air content of the concrete.

Read the new "specs" on the amount of air that must be entrained, and then use Darex AEA as a gauge-water addition. You can meet the specifications and keep the control of the air content in your hands. It's the only way you can compensate for changes occurring in the field.

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RECENT BIDS

Reinforced Concrete Pavement —Maryland

Project: Construction of 3.086 miles reinforced concrete pavement on Reisters-town-Westminster Road. Letting agency, Maryland State Roads Commission.

Bids received March 26, 1946.

Contractors' Bids Received:

(1) C. J. Langenfelder & Son, Baltimore, Md.....	\$763,546
(2) John H. Ensey, Baltimore, Md.....	770,243
(3) Thomas, Bennett & Hunter, Inc., Westminster, Md.....	834,917
(4) Frank Carozza, Baltimore, Md.....	980,129

Bid Items, Three Lowest Bidders

		(1)	(2)	(3)
Clearing and grubbing	L.S.	\$ 14,000	\$ 2,000	\$ 6,500
Class No. 1 excavation.....	224,000 Cy.	.69	.63	.74
Class No. 2 excavation.....	4,000 Cy.	1.50	1.25	1.50
Class No. 5 excavation.....	3,900 Cy.	1.50	1.25	1.50
Borrow excavation	255,000 Cy.	.45	.50	.48
Tamped fill	7,950 Cy.	.80	1.00	1.75
Earth shoulders	1,500 Sy.	.20	.25	.15
Seeding and mulching.....	71,000 Sy.	.12	.12	.22
Sodding	15,200 Sy.	.60	.65	.60
Trimming exist. ditches.....	500 Lf.	.20	.25	.60
Removal exist. masonry.....	10 Cy.	20.00	10.00	10.00
Macadam base course, 5 in.	11,850 Sy.	1.18	1.20	1.40
Stab. base course.....	24,500 T.	2.70	2.25	2.15
Calcium chloride	28 T.	50.00	45.00	40.00
Conc. bs. crs., 6 in.	6,700 Sy.	2.56	2.75	3.30
Stab shoulders	26,500 Sy.	.63	.70	.70
Pen. mac. surf. crs.	11,850 Sy.	.70	.82	.90
Bit. material for pen. mac.	32,000 Gal.	.12	.10	.12
RCCP 8 in., sid. 8 in. cen.	64,000 Sy.	3.19	3.60	3.75
RCCP 8 in., sid. 8 in. cen.	13,100 Sy.	3.53	3.80	4.12
PCCP 8 in., sid. 8 in. dep.	350 Sy.	3.21	3.55	3.67
Bit. surf. crs. spec. "C".....	750 T.	8.00	8.00	10.00
Top dressing	30 T.	4.00	7.00	4.00
Bit. material for tack coat.....	700 Gal.	.15	.15	.12
Agg. backfill	100 Cy.	5.00	5.00	4.50
6" perf. cor. metal pipe underdrain.....	1,100 Lf.	1.00	.89	.70
6" cor. metal pipe underdrain outlets.....	100 Lf.	1.00	.87	.70
6" "Y" branches for cor. metal pipe underdrain.....	8 Ea.	1.50	8.00	6.00
15" asph.-coat. cor. metal or reinf. conc. pipe....	821 Lf.	2.00	1.80	2.00
18" asph.-coat. cor. metal or reinf. conc. pipe....	204 Lf.	2.50	2.15	2.50
24" asph.-coat. cor. metal or reinf. conc. pipe....	118 Lf.	3.50	3.00	3.75
36" asph.-coat. cor. metal or reinf. conc. pipe....	147 Lf.	6.50	6.75	7.00
42" asph.-coat. cor. metal or reinf. conc. pipe....	116 Lf.	8.50	7.75	8.50
48" asph.-coat. cor. metal or reinf. conc. pipe....	879 Lf.	10.00	9.15	10.00
12" asph.-coat. corruga. metal pipe.....	338 Lf.	2.50	1.98	2.25
15" asph.-coat. corruga. metal pipe.....	174 Lf.	3.00	2.17	2.50
18" asph.-coat. corruga. metal pipe.....	48 Lf.	3.50	2.54	3.25
Remov. old pipe culverts, any size.....	100 Lf.	1.50	1.00	2.50
Relaid old pipe culverts, any size.....	100 Lf.	1.50	1.00	2.50
Cl. A conc. pipe endwalls, using Cl. A conc. reg.	100 Cy.	60.00	75.00	45.00
Cl. A conc., using regular cement.....	10 Cy.	80.00	50.00	45.00
Reinforcing steel bars.....	7,250 Lb.	.10	.08	.10
PCC gut., 5 in. dep. A.....	2,750 Sy.	3.50	3.50	3.00
PCC gut., 8 in. dep. A.....	100 Sy.	4.50	3.75	4.50
Comb. cem. conc. curb. and gut.	700 Lf.	2.00	1.50	1.50
Conc. sidewalk, 5 in. A.....	200 Sf.	.38	.35	.50
Dry rip rap, Cl. No. 1.....	100 Sy.	6.00	17.00	6.00
Guard rail, three cable.....	13,800 Lf.	1.00	.80	1.00
End anchorages	52 Ea.	50.00	30.00	50.00
Intermediate anchorages	6 Ea.	100.00	60.00	90.00
Maintenance of traffic.....	L.S.	5,000	5,000	11,000
Totals		\$763,546	\$770,242	\$834,917

mands for such items."

Second—The A.G.C. can approach the various Federal Government Authorities carrying on construction work along these same lines and discuss with them the specifications they put out.

While this is going on, each of us in our own areas can work with our own States, Counties, Cities, etc., on their own specifications and all together working in one direction, much good can be accomplished.

Of course if this constructive effort has no effect, we still have the public to appeal to for protection of their own interests, although I am

sure that a pleasant constructive approach to those responsible for specifications will make this public appeal unnecessary.

We in the Constructors Association of Western Pennsylvania have approached our State Highway Department in just this way and received a very pleasant, courteous reception, and while all the changes we suggested have not been made at once, there is an indication of a willingness to work out the proper answer and I hope this effort on my part here this morning will start thinking and actions that will be beneficial to our Industry throughout our whole nation.

(Continued from page 82)

ment. The plugs at each end of a section of pavement are accurately stationed so that over-all movement may be observed.

Mud Jacking Required

A section of existing pavement on Admiral Wilson Boulevard, near the end of the overhead approach has settled considerably due to having been constructed over an old river bed. State maintenance forces are now carrying on extensive mud jacking operations to bring this section up to original grade. A very sandy soil, available for 15c per cu. yd., is being centrally mixed with 8 sacks of cement per cu. yd. and hauled dry to the mud jacking machine. The material is screened to remove oversize stones and lumps. Despite raising slabs as much as 6 in., cracking of the slab has been minimized by careful workmanship. The slabs are being drilled on 7 ft. centers and 30 in. in from the edges.

Julian Canuso is the contractor's superintendent on the job. John A. Williams, district engineer, and Frank I. Shoemaker, resident engineer, are covering the project for the state.

Paul Holland Dies

Paul Holland, 50, chief highway design engineer of Wayne County Road Commissioners, Detroit, Mich., died April 14. He was graduated from the civil engineering department of the University of Michigan in 1919. He became chief highway design engineer of Wayne County Road Commissioners, Nov. 15, 1919, and since then has designed the entire system of county roads in Wayne County. As a member of the Highway Research Board, he was consultant on national highway economics, design, roadside development, materials, construction, soils, maintenance and traffic operations. For the past several years, he has participated with city and state officials on the engineering and design of the John C. Lodge Expressway and the Detroit Crosstown Expressway. Mr. Holland also designed the out-county sewer and water systems and the present Wayne County Airport. In the past year he prepared designs for the enlargement of the Wayne County Airport.



Paul Holland

(Continued from page 83)

"The cost of timber has advanced to such an extent in the past 5 years and at such a greater rate than steel and concrete that a new bridge replacement can now be built for about the same cost in concrete and steel as in timber. Where complete reconstruction is required, therefore, we start off with the assumption that we will use concrete girder spans or I-beam spans with concrete floor supported on concrete or steel piling.

"We purchase directly and for our own use a great amount of timber for small repair jobs, but all jobs of any size are let to contract. Generally speaking unit prices received on our contract work indicate that treated timber and piling in the past 5 years have advanced about 100%, while unit prices bid on concrete, reinforcing steel, concrete piling, and steel piling have advanced about 50%. As a result, a 24-ft. roadway bridge designed for an H-15 loading and consisting of a series of short spans, say not over 25 ft. each, can be constructed at about the same cost either in treated timber or in steel and con-

crete, or at about \$110 per linear foot of bridge depending on pile length.

"This, however, does not remove the necessity for using a great amount of treated timber, preferably "Stress Grade," for repairs or partial replacements of existing bridges. There will also continue to be needed a large amount of treated timber and piling in fender systems for movable bridges. The railroads are understood to be securing a good quality of stress grade lumber and we feel that a certain amount of this material should also be allotted to the various highway departments.

"In our attempt to secure additional economy in our concrete girder and I-beam bridges for secondary road projects, we have prepared standard designs for the most commonly used span lengths in such a way as to encourage the use of steel forms. In other words, the curb, handrail, and overhang of the outside girder or beam and the spacing of beams are the same throughout. We have also used unit stresses slightly higher than common practice, that is 20,000 psi. for steel and 1,000 psi. for concrete.

Recapitulation of Letter Survey (May 2) on State Highway Department Needs for Lumber for Bridge Maintenance Purposes

State	Approx. No. of Wooden Bridges	Approx. Total Length in Miles of Bridges	No. of Board Feet Required for Maint.
Alabama	1,500	36	2,500,000
Arizona	.....	.....	100,000
Arkansas	1,433	23.26	1,500,000
California	2,003	30.6	200,000
Colorado	.....	.....	.....
Connecticut	100	2	80,000
Delaware	573	2.5	258,500
Florida	1,622	39	2,000,000
Georgia	.....	.....	.....
Idaho	241	6	1,200,000
Illinois	2,928	29.6	.....
Indiana	27	0.67	.....
Iowa	.....	.....	.....
Kansas	400	5.68	634,000
Kentucky	483	11.3	1,800,000
Louisiana	3,550	56.037	962,725
Maine	150	4.5	.....
Maryland	1,100	11	600,000
Massachusetts	200	.6	70,000
Michigan	76	1.65	65,000
Minnesota	56	0.89	25,000
Mississippi	1,200	12	200,000
Missouri	1,000	17	200,000
Montana	.....	.....	.....
Nebraska	884	12.26	120,000
Nevada	73	0.71	.....
New Hampshire	30	0.6	48,000
New Jersey	61	1.565	110,000
New Mexico	1,500	17	100,000
New York	75	2	100,000
North Carolina	29,000	150	2,500,000
North Dakota	25	0.75	30,000
Ohio	2,526	39.1	1,250,000
Oklahoma	.....	.....	.....
Oregon	1,750	25.3	630,000
Pennsylvania	2,360	9.5	600,000
Rhode Island	36	.66	.....
South Carolina	1,250	29	1,000,000
South Dakota	141	1.4229	206,000
Tennessee	713	10.41	650,000
Texas	528	10	495,000
Utah	503	4.4	175,000
Vermont	.....	.....	.....
Virginia	4,519	53.86	1,500,000
Washington	529	16.66	1,800,000
West Virginia	.....	.....	1,000,000
Wisconsin	175	5.3	225,000
Wyoming	739	10	63,356

*Practically none. †Same. ‡None.
Member Departments not canvassed: District of Columbia, Hawaii, Puerto Rico and Public Roads Administration.

(Continued from page 72)

At the insistence of Ed C. Johnson, then governor, the money was borrowed. It launched a system of highways suitable for 1936, but not for the present day.

The state has been paying principal and interest on the anticipation warrants, or I.O.U.'s, for ten years, and it still owes more than it has paid. The interest payments to date have amounted to \$5,662,740, yet the principal still owed totals \$15,435,000. Before the final installment is met in 1954 another \$2,022,962 in interest will be shelled out. The 25 million will have cost more than 32 and one-half million dollars.

And, while we have been paying, the roads the money bought have been growing obsolete and need overhauling or replacement.

Governments, like people, should not borrow if they can afford to pay cash. Colorado can pay as it goes.

The state's 4-cents-per-gallon gasoline tax, which is more a service charge than a tax because only motorists pay it and the proceeds go almost entirely into highways, nets about 8 million dollars per year. That is reckoned on the present rate of collections, and does not include amounts refunded for non-highway gasoline uses and administrative expenses. Each cent per gallon of tax yields, then, about 2 million dollars. Increased postwar highway travel may make the income greater still.

Eight million dollars a year sounds big, and it is. However, payments on the old road debt have taken an average of around one and one-half million dollars in each of the last ten years, and the payments go on for another eight years. The operation of the highway department takes a great deal of money. That is necessary because we cannot build highways without careful, expert planning and supervision. Maintenance, also essential, takes a big slice of present funds.

Increased building costs and the vital need for better highways than ever before built pile up proof that the present highway income is insufficient for a merely adequate road program, with no fancy luxuries in the way of super highways thrown in.

But there is this comforting thought: The fixed charges are being met now; what additional would be raised by a gasoline tax increase would all be available for highway construction.

Three choices? Yes, but good judgment tells us there can be only one decision: Increase the gasoline levy by enough to pay for what we need, and once on a cash basis, stay there.

Half a Century of Truck Progress... A PICTURE HISTORY



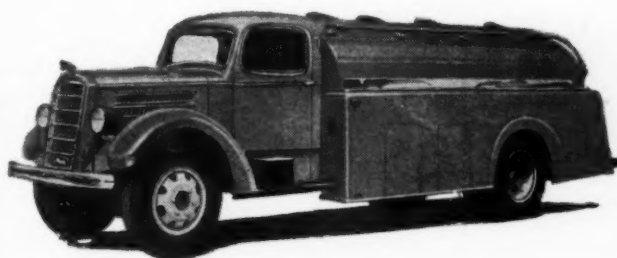
1906 The first Mack commercial gasoline vehicle was delivered in 1900. It operated as a bus and later as a truck for 17 years. By 1906, the automotive industry's tenth birthday, Mack trucks had many advanced features, including the "high cab" (above), granddaddy of today's cab-over-engine design.



1916 Ten years later came the famous AC "bulldog" model which made the phrase "built like a Mack truck" a popular synonym for rugged strength. You can still see many of these trucks grinding along through city streets, steadfastly making money for their owners and looking quite at home in modern traffic.



1926 More powerful engines were being used, and by 1926 pneumatic tires were fast displacing solids and making possible greater road speeds. These progressive trends, plus certain exclusive refinements of Mack engineering, were embodied in the Mack AB.



1936 An important milestone in truck history was the introduction, in 1936, of the now widely-used Mack EH—a model which surpassed anything previously attained in truck performance.



1946 Today, with World War II experience crowning its 46 years of production, Mack again takes the lead in building the world's hardest-working trucks... trucks which set industry standards for stamina, performance, economy and long life.

*The Automotive Industry's
50th Anniversary is Mack's 46th*

Mack

**TRUCKS
FOR EVERY PURPOSE**



Mack Trucks, Inc., Empire State Bldg., New York 1, N. Y.
... Factories at Allentown, Pa. . . Plainfield, N. J. . . New Brunswick, N. J. . . Long Island City, N. Y. . . Factory branches and dealers in all principal cities for service and parts.

PERFORMANCE COUNTS!

How to Get the Most From Your Electric Tools

Following these few simple suggestions offered by Skilsaw, Inc., you will get longer service, better performance and greater production from all your portable electric tools.

The Care of Motors

1. Keep Motors Clean

Electric tool motors should be blown out frequently with compressed air to remove dust and dirt which might accumulate and clog air vents. In addition, tools should be dismantled occasionally and cleaned thoroughly by washing, brushing and drying all parts. A clean tool will get proper ventilation around the motor windings and will therefore run cooler.

2. Avoid Motor Overload

Overloading, with its severe strain on gears, bearings and particularly on the motor, is the most common cause of breakdowns. Tools will not stand up indefinitely under this type of abuse. Frequent causes of overload are: starting or stopping tool while it is in the work; crowding or jamming tools in an attempt to hurry the job; dull bits or blades; severe voltage drop under load due to under-size cord or over-loaded power line.

3. Inspect Commutators

Motor commutators are subjected to constant wear from the brushes, and they should be inspected regularly. When wear becomes evident, the armature should be removed, and the commutator should be turned down in a lathe and spaces between the bars should be under-cut. Prompt care of slightly worn commutators will avoid complete breakdown.

4. Check Brushes

Be sure brushes slide easily in holders, seat properly on the commutator and that spring tension keeps them seated. Replace brushes before

they wear down to irregular stubs... it's cheaper to replace them frequently than to risk the damage caused by worn brushes. Keep metallic dust from accumulating around brush and commutator. Replace broken brush caps immediately. Do not use substitute brushes. Brushes are made to fit specific motors, and improper brushes will injure the commutator.

General Tool Care

5. Lubricate Regularly

To keep wear at the minimum, lubricate all tools regularly. Use only the lubricants recommended for each and use exactly according to instructions. Clean gear cases periodically with kerosene and then refill to the proper level with the proper lubricant. Correct lubrication is the best insurance against gear and bearing failure!

In highest quality tools, gearing calls for little more than proper lubrication and infrequent but regular inspection.

6. Protect Electric Cord

The care of electric cord is extremely important. Keep cords free of grease and oil which cause rapid deterioration of the rubber. Avoid kinks, sharp bends and unnecessary bending to prevent breaks in the wire. Never lay cords over sharp bricks, stones or rails which could fray or cut the cover. When cable must be laid where wheelbarrows or trucks cross, it should be protected by parallel planks, as illustrated. Do not carry tools by the cord or jerk the plug from outlets. When tool is not in use, the cord should be carefully cleaned and coiled—never kinked or wadded—into its storage place.

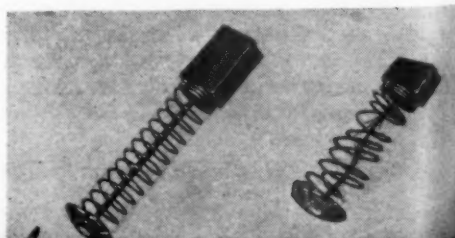
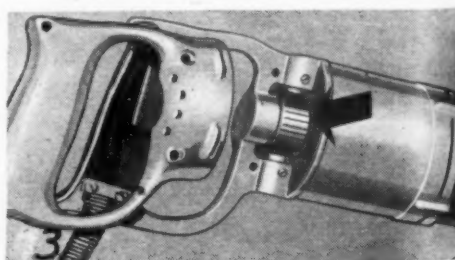
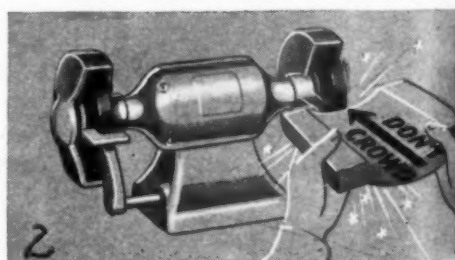
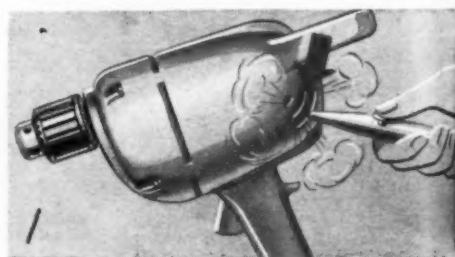
7. Use Proper Gauge Cord

For satisfactory operation, portable electric tools must have full voltage under load, an impossibility when under-size extension cords are used.

For instance a 200 ft. 18 gauge cord will operate a ¼ in. drill at maximum efficiency, but it will not operate a 9 in. saw because of the greater power requirements of this unit. Use proper gauge cord and avoid the danger of serious drop in voltage and of motor burn-out.

8. Avoid Overload

Overloading of electric handsaws results from mistaken efforts to rush jobs. Overloading can be avoided by a



few simple precautions: Do not jam saws into the work, as jamming causes stalling and serious motor strain. Do not start or stop saws while the blade is stalled in the work. Starting or stopping while stalled also throws overload on the switch and will cause quick burn-out. Do not use dull, incorrectly sharpened or poorly set blades, as they not only slow down the work but cause overload by binding in the cut.

The Care of Saws

9. Use Correct, Sharp Blades

Fastest, most efficient sawing is assured only when blades are kept sharp and properly set. This work can be done by any user, and the only tools needed are inexpensive saw sets, micrometer gauges and quality files. After a number of sharpenings in the field, however, blades should be completely reconditioned by a professional man. Since this requires hammering, gumming, setting, jointing and filing, it should not be attempted in the field. Due to the great variety of materials cut and operations done by electric handsaws, a wide range of blades is available.

Using the correct blade for each

job avoids the possibility of motor overload and assures the greatest sawing speed. Most widely used of all is the combination blade suitable for both cross-cutting and ripping. Rip blades, cut-off blades, grooving, fine-tooth, mitre, friction, flooring and high-speed hollow-ground blades are available for specific cutting jobs. Abrasive Discs are used for cutting concrete, tile, marble, granite, asbestos cement sheets, cast iron, alloy steels and many other metals and materials.

The Care of Drills

10. Use Correct Bits

Every electric drill is designed to a maximum drilling capacity, and the use of over-size bits is certain to cause overload and motor burn-out. Consequently, the practice of turning down shanks to get an over-size bit into a chuck of smaller capacity can only result in unnecessary breakdown. Keep bits sharpened properly to insure fastest drilling.

11. Protect Chucks

Most drill chucks are actually precision instruments and should be treated as such. Their firm true grip on the bit (essential to perfect drilling) can be maintained indefinitely with proper care. Use proper size chuck key—and no other tool—for tightening and loosening the chuck. For most accurate chucking, first run jaws out until the bit is held firmly and then tighten each jaw individually. When drill is not in use, keep jaws retracted so they are not exposed to blows or bumps. Excessive bumping also can reduce drilling accuracy by damaging the precision-ground, threaded spindle on which the chuck is mounted.

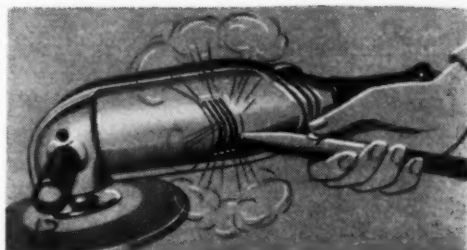
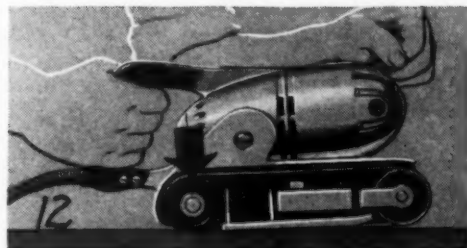
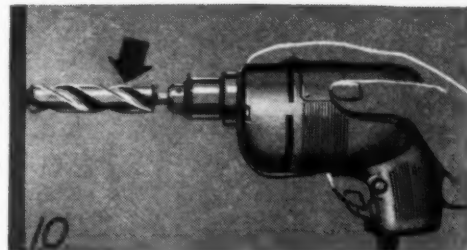
The Care of Sanders and Grinders

12. Don't "Bear Down"

Belt sanders, disc sanders and grinders are carefully designed to operate at correct speeds for maximum efficiency. Speed . . . not pressure . . . does the work. They perform best with firm uniform pressure, and "bearing down" only reduces the speed of the machine, slowing down the job and throwing overload on the motor.

13. Keep Tools Clean

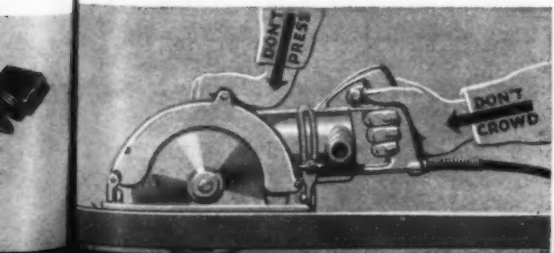
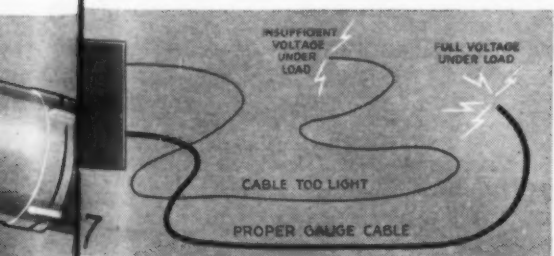
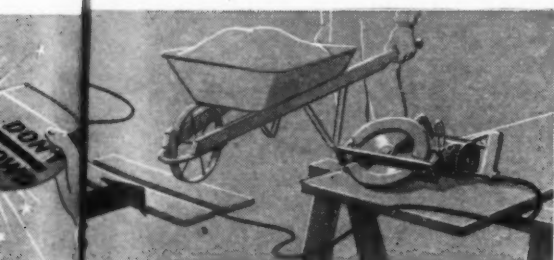
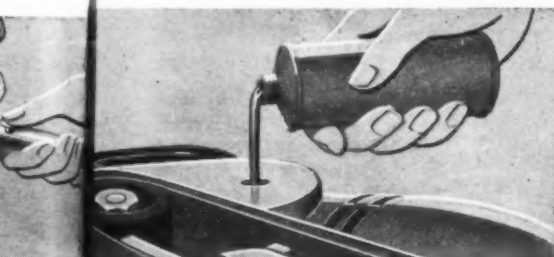
Abrasive tools need extra cleaning because of the dust and dirt they create. Daily blowing out will remove much of this dirt and prevent accumulation, but periodic dismantling and thorough cleaning is also necessary. Since carbon and metallic dust are likely to accumulate in the commutator and brush chambers of disc



sanders and grinders, be sure to connect the ground wire in order to avoid shock that might result from current carried by this dust.

Care for Belts, Wheels, Etc.

In order to be sure of obtaining top production and performance . . . and lowest operating costs . . . the accessories used with any abrasive tool must be properly cared for, according to these few common-sense suggestions. Sanding Discs will last longer and keep cutting faster if washable discs are used and if they are cleaned in kerosene before they become fully clogged. Do not use a wire brush for cleaning. Keep the face of Cup Grinding Wheels properly dressed to eliminate chatter and insure smoother work. Avoid dropping or any other blow which might crack the wheel. Store all Sanding Belts in a cool, dry place. Be sure belts are properly centered on the rollers and are installed to travel in the right direction as indicated by arrow. This prevents splitting caused by working against the glued lap. Always use the recommended type, size, and grit of each Sanding Disc, Grinding Wheel, Wire Brush, Sanding Belt or other accessory.



Watch Wheel Alignment (This Goes for Truck Owners and Operators)

A reminder by Ray Harper, Asst. Commissioner, Motor Carriers Division, Ill. Dept. of Public Works, suggests that proper adjustment of brakes, lights, and wheel alignment are the major safety factors of any motor vehicle.

Brakes—don't start if you cannot stop.

Lights—don't drive if you cannot see.

Alignment—don't drive if you cannot control the vehicle with ease.

As a safety factor, proper adjustment of steering mechanism is one of the most important items in servicing the motor vehicle. Any motor vehicle with defective steering is a potential instrument of destruction.

Improper wheel and frame alignment are also decidedly contributing factors to tire wear. Therefore, proper adjustment may be considered from a viewpoint of economy. The trend toward smaller diameter tires, lower inflation pressures, and higher road speeds has greatly increased the effectiveness of abrasive action between the tire tread and the road surface. Accurate wheel alignment has, consequently, become more imperative to normal tire life.

"Spot" Sale of Surplus Machinery Probable Permanent War Policy

"Spot" instead of "site" sale of war surplus heavy construction and roadbuilding machinery will probably be maintained as the permanent War Assets Administration sales policy for this type of surplus. This is the belief of industry representatives watching the various sales and disposal techniques of government surplus disposal agencies.

Recently members of the Committee on Disposal of Government Surplus of Associated Equipment Distributors, headed by Ed P. Phillips of Richmond, Virginia, held several conferences with Lt. Gen. E. B. Gregory and his aides to discuss the viewpoint and problems of those responsible for distribution of the heavy construction and roadbuilding machinery.

Committee members were impressed with the realistic manner in which the new War Assets Corporation, as one member put it, "seems to be getting down to brass tacks on this surplus property business, at long last." A.E.D. members emphasized to WAA

officials that "spot" sales of such machinery afford a more equitable and widespread distribution of surplus construction machinery with a program based upon a monthly cycle of operations, than "site" sales which are limited largely to local distribution and hinder participation of many buyers in other parts of the country. At the time WAA spokesmen indicated that it was "the present policy" to exclude construction machinery from "site" sales, and A.E.D. officials feel that since no word indicating likelihood of change of policy has emanated from WAA up to now, and since the "spot" method of disposal is approved by the majority of dealers over the country, the industry may anticipate its being followed until all such surplus has been disposed of.

The apparent willingness of General Gregory and his staff "to accept the recommendations of the industries actually affected by the method of disposal of multi-million dollars worth of surplus consumer goods—at least insofar as the construction machinery industry is concerned," is hailed by A.E.D. president Frank B. McBath "as one of the most refreshing and enheartening governmental developments of recent years."

A.E.D. Regional Conferences

Disposal of Government surpluses of construction machinery, Civilian Production Administration regulations and ratings, OPA selling price and rental controls, and national, state and local legislation affecting the distribution of heavy construction machinery were among topics discussed at Regional Conferences of the Associated Equipment Distributors (A.E.D.) held in various parts of the country during April and May. Conferences were scheduled at Little Rock, Kansas City, Dallas, Duluth, and elsewhere, with local equipment leaders in attendance.

City Runs Buses to Parking Lots

Cincinnati's first shuttle buses are operating between free parking facilities and the downtown business district. Buses operate every five minutes and the ride costs only five cents.

This effort to offset congested downtown Cincinnati for shoppers and other parkers is sponsored by the Cincinnati Automobile Club and the Street Railway Company. Plans were launched at a meeting of 98 presidents and executives of downtown civic organizations.

Construction Inspectors Get Advance View of Postwar Work

A one-day meeting for the instruction of construction inspectors was held recently by the Connecticut state highway department. The program was organized into a series of short informal talks on the various phases of highway design, inspection, changes in administrative procedure, pertinent specification alterations and other topics that might be encountered in carrying out the postwar construction program of the department.

Leslie G. Sumner, director of engineering and construction, presided. Speakers included Raymond T. Healy, engineer of materials; Edwin Burdick, superintendent of bridges, and several resident engineers.

Among the subjects considered were the improvement of procedure on bridge erection to provide simpler maintenance work afterward; a comprehensive summary of methods of placing bituminous macadam pavements; the control of concrete pavement installation; general excavating and grading problems; the construction of town aid roads; drainage installations and culvert construction. These topics were discussed by Mr. Burdick and the resident engineers. Mr. Healy's talk dealt with materials problems; the necessity for constant tests and checks during construction; and the use of new materials and methods which have been developed through physical and chemical science.

\$112,000,000 Voted for Highways— Citizens of Chicago, Ill., on June 3, voted in favor of a \$42,000,000 city bond issue for super highways. A super highway bond issue of \$70,000,000 for Cook County in which Chicago is located, also was authorized at the same election.

Superhighway Plan for England— A 10-year plan has been announced in the British House of Commons for repairing and rerouting the ancient Roman-planned highways to create a new traffic network along the lines of the U. S. superhighways.

Fourteen Per Cent Increase in Gas Tax Collections— State motor-fuel tax collections, plus receipts such as inspection fees, dealer's license fees, fines and penalties, aggregated \$784,903,000 in 1945, against total collections of \$682,234,000 in 1944. Taxes on aviation gasoline, amounting to \$1,212,000, are included in the 1945 figure.

California Abandons Yellow "No Passing" Stripe

The yellow "No Passing" traffic line, long used in California on state trunk highways, has been eliminated as a design feature by the California Division of Highways. Under a state law, and in conformity with national uniform traffic signing practices, former "No Passing" zones are to be marked with two continuous or solid parallel white lines. A combination solid and broken white line will be used where passing is restricted to one direction for vehicles approaching a blind crest or grade. Passing is permitted when the broken line is the driver's lane.

A solid white or barrier line on the right of the broken line and in the driver's lane will indicate "No Passing."

A driver may overtake and pass a slower vehicle if the broken line is in his lane, providing the way ahead is clear.

Several months will be required this year to convert pavement markings to the new scheme.

1.7% Increase in Motor Vehicle Registrations

Registrations of private and commercial motor vehicles in 1945 totaled 30,606,859 as compared with a total of 30,086,189 in 1944, an increase of 520,670 or 1.7 per cent. Registrations of publicly-owned vehicles rose from 393,117 in 1944 to 396,991 in 1945. Trailers and motorcycles are not included in the above figures.

Truck registrations last year totaled 4,830,458, against 4,513,340 in 1944, an increase of 317,118. The number of privately-owned automobiles and taxicabs registered in 1945 was 25,664,524, an increase of 198,193 over 1944 registrations. Apparently many cars were brought out of storage, as the number of new cars reaching private users does not account for the increase.

Missouri Accidents Up 140%

Reflecting the nationwide increase in highway accidents, the accident rate in Missouri's roads increased 140% during the first four months of 1946, as compared with a year previous. Of the 163 fatalities reported (in 2032 accidents), only 41 were pedestrians. Reported injuries included 1843 passengers and 77 pedestrians.

Tennessee Bridge Toll Opponents Organize

Opponents of continuation of toll collections on eight of Tennessee's highway bridges recently organized a Tennessee Free Bridges Association and named a six-man executive committee to carry the fight against tolls to all parts of the state. Judge E. W. Ross of Savannah, Tenn., is chairman.

The toll opponents state that Tennesseans recognized the necessity of the toll system when bridges were built to replace ferries but maintain

that fees collected total more than twice the cost of the bridges. They also claim that new sources of revenue have been found which eliminate the necessity of continuation of the tolls.

Average Gas Tax 4.1 Cents—The average gasoline tax per gallon for all states was 4.10 ct. in 1945, as compared with an average tax of 4.06 ct. per gallon in 1944. State gasoline tax rates last year ranged from 2 ct. per gallon in Missouri to 7 ct. a gallon in Florida, Louisiana and Tennessee, and 7½ ct. in Oklahoma.

OTC
MAINTENANCE
TOOLS

for
FAST REPAIRS
on the Job or
in the Shop

The OTC PULLING SYSTEM makes quick work of removing and replacing gears, bearings, sleeves, wheels, pulleys, shafts and other close-fitting parts—without damage to machinery, without back-straining labor. Approved by Hyatt, M-R-C, New Departure, SKF and Timken for use on their bearings. Portable . . . as effective for field maintenance and repairs as for shop use.

To meet YOUR Needs—OTC GRIPOMATIC PULLERS, PUSH-PULLERS, Pulling Attachments and Adaptors. Heavy Duty BOX WRENCHES and Special Tools are made in a wide range of sizes and types.

OTC Maintenance Bulletin shows some of the many time-saving uses of OTC TOOLS. Write for a copy.

OWATONNA TOOL CO., 319 Cedar St., Owatonna, Minn.

GRIPOMATIC PUSH-PULLERS PULLING ATTACHMENTS Heavy Duty BOX WRENCHES SLEDGING WRENCHES, SPECIAL TOOLS

Mail Inserted Card

for data on equipment
described on these pages

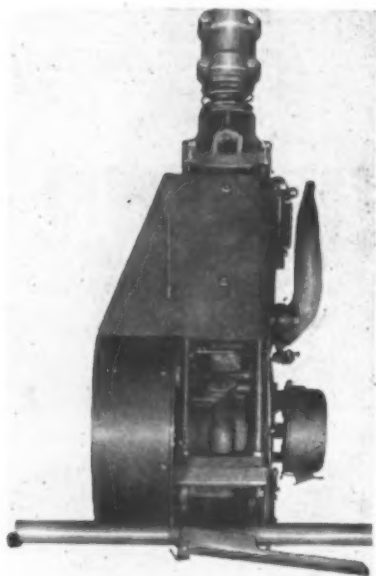
NEW EQUIPMENT AND MATERIALS

Postwar Parade

of New Construction Equipment and Materials

New Gasoline Hammer Spike Drivers

1. A new improved model gasoline hammer spike driver has been brought out by the Syntro Co., Homer City, Pa. This spike driver is designed around their gasoline hammer paving breaker except for the nose end tool retaining casting which has been shortened to reduce the overall height of the tool to 32 in., and which decreases the weight of the hammer, including the driving tool.



New Gasoline Hammer Spike Driver

to 92 in. The hammer is completely 100 per cent self-contained, and is made up of a single cylinder, air-cooled gasoline engine with fly wheel ignition and forced ventilation air-cooling. The engine cylinder contains two pistons—one the conventional engine piston and the other a striking or hammer piston. The hammer piston acts as a movable cylinder head for the engine piston and strikes directly on the tool at every explosion, being returned to the firing position by low pressure exhaust gas.

New 3-4 Ton Tandem Roller

2. A new 3-4 ton tandem roller has been added to the line of The Huber Manufacturing Co., Marion, O. The new machine weighs approximately 3 tons, but its weight can be increased to more than 4 tons by addition of water ballast. Some of the overall dimensions of the new tandem are as



New 3-4 Ton Tandem Roller

follows: Length 124 in., width 48 in., height 67 in., height to top of water tank 51 in., wheelbase 80 in., and ground clearance under frame 10 in. The gasoline engine is a V-type, 4-cylinder, air-cooled. Two forward and two reverse speeds (low, 2.6 mph.; high, 4.4 mph.) are obtained through special forward and reverse clutches. All operating levers are within easy reach of the operator, and both the steering roll and the compression roll are equipped with rust-resisting sprinkler pipes, gravity-fed from a large water supply tank. Anti-friction bearings are used wherever wear is likely to occur.

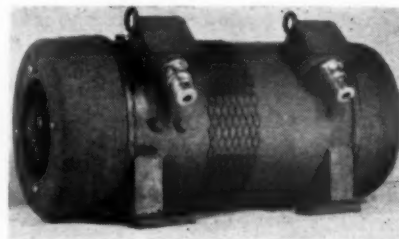
New Equipment for Grease Guns

3. New equipment just announced by the Alemite Division of Stewart-Warner Corporation, Chicago, is stated to have made the loading of hand guns a simple, clean, quick operation. The new method is claimed to eliminate disassembly of the hand gun, to preclude danger of lubricant

contamination or waste, to eliminate annoyance of air pockets in the gun and to permit gun loading in a few seconds. A new "gun-loader fitting" which is mounted on the head of a hand gun and permits grease to flow into the grease reservoir of the gun in the same manner that it flows into a bearing through a lubrication fitting in normal lubrication, is the key innovation of the new gun-loading system. A loader valve mounted on a bucket pump or loader pump, functioning in the same manner that a coupler does when applied to a fitting, is the companion item to the loader fitting on the hand gun.

New Motor-Generator Set

4. A new compact high frequency motor-generator set has been announced by Kato Engineering Co., Mankato, Minn. It produces 1000 volt-amperes (watts) at 115-volts A.C. Designed to operate from 75-volts direct current. All steel construction. This unit runs on dual set of ball bearings in each end bracket. Removable end covers makes D.C. brushes and collector ring brushes easily accessible. Designed for continuous operation. Commutator of extra large



New 30-in. Power Lawn Mower

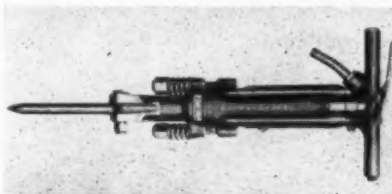
size with four sets of brushes with surplus cross section making for long brush life. Four poles, 3440 R.P.M. Approximately 23-11/16 in. long by 12-3/8 in. wide by 13-3/8 in. high and weighs approximately 210 lb.

New Crushing and Screening Plant

5. The No 46-VE, the first in a new line of portable semi-electric powered duplex crushing and screening plants, has been announced by Pioneer Engineering Works, Minneapolis, Minn. In this new plant, the screen and conveyors are driven by electric motors from power supplied by a diesel-electric plant. The roll crusher is driven by V-belts from the jaw crusher, which in turn is driven by flat belt to the diesel motor. A clutch provides for starting and stopping the crusher without interrupting the diesel drive to the generator. The operating height of the plant has been lowered from 19½ ft. to approximately 14½ ft. and provision has been made for hydraulically lowering the screen so that when in transit the plant has only an overall height of 12½ ft. It is not necessary to remove the hopper when lowering the screen, thus much moving and set-up time is saved. Moving weight is only 64,000 lb. A low angle type, 3½ deck, 4 ft. x 12 ft. screen is used with a 1036 jaw crusher and a 40 in. x 22 in. roll crusher. All main bearings are of the anti-friction type. The plant is mounted on a main truck supported on three axles with an equalizer between the two rear axles. Pneumatic tires are standard equipment. Feeder and delivery conveyors are mounted on the new Pioneer hydraulic cradle type trucks and are portable.

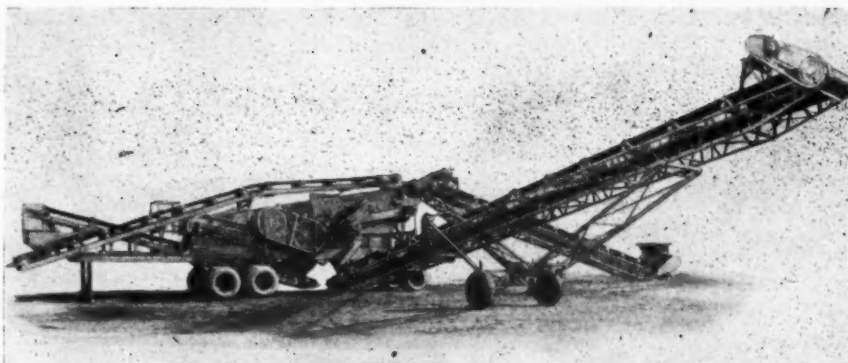
New Paving Breaker

6. A newly designed paving breaker has been added to the line of contractor air tools of Worthington Pump and Machinery Corporation, Harrison, N. J. New features built into the machine increase its performance, versatility, ease of handling and durability, the manufacturer claims. The new design includes positive action, end-seating, automatic valve not affected by wear, a



WB-81 Blue Brute Breaker

large capacity built-in lubricator, a fully cushioned piston, a heavy duty, interposed anvil block with large striking surface, and spring cushioned side rods. Self-locking nuts are used



No. 46-VE Portable Diesel-Electric Duplex Crushing and Screening Plant

throughout, and the cylinder is precision-ground, hardened and honed for greater efficiency and longer life. Forgings and alloys are used for all major parts, and all component parts are carefully heat-treated.

New Power Mower

7. A 30 in. power lawn mower, stated to be completely new in design and principle, has been brought out by John A. Roebling's Sons Co., Trenton, N. J. It is stated that the mower will cut and trim a lawn in one combined operation and cover ½ acre per

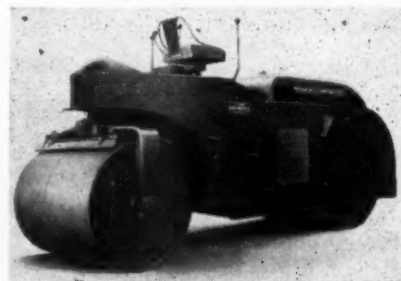


New Motor-Generator Set

hour. The machine's rotary action is similar to that of two electric fans placed side by side and face down over the grass. The horizontal blades, whirling at high speed, reach up to the very edge of posts, trees, fences and other obstructions, almost completely eliminating back-breaking "after-trimming." The mower is said to be able to cut all grasses or weeds, regardless of height, and to eliminate grass-matting and over-lapping runs, since the wheels are behind and well inside the path of the cutting blades.

New Line of Tandem Rollers

8. A complete new line of tandem rollers, stated to incorporate many new mechanical improvements, has been announced by the Buffalo-Springfield Roller Co., Springfield, O. These models supplement the new 10 and 12 ton 3-wheel rollers and 3-4 ton tandem previously announced by this company earlier in the year. The



New Tandem Roller

new models are produced in sizes of 5-8 tons, 6-9 tons, 8-12 tons, and 10-14 tons and can be powered with either gasoline or Diesel engines. Many of the basic principles of previous Buffalo-Springfield tandems are included in the new design including the bevel gear final drive, side air intake, drive-opposite-operator, simplified clutch shifter, low pressure hydraulic steering, and compact engine, transmission, and final drive pinion unit assembly. A new simplified 4-speed forward and reverse transmission has been added to provide a properly stepped speed range for all types of operating conditions.

Greatly improved engine and transmission controls, a refined hydraulic pump and hydraulic steering circuit, and a further advanced bevel gear and pinion final drive are additional features of the new rollers.

Traffic Baton

9. A traffic baton of the type made for the U. S. Army for night direction of traffic is now being offered to

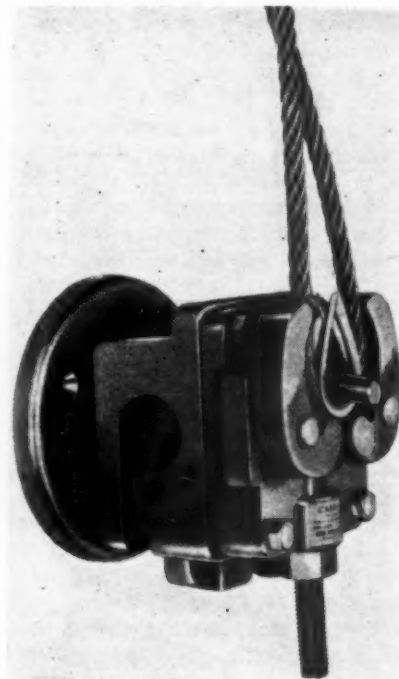
the public by Signal Service Corp., Elizabeth, N. J. The baton consists of a light-barrel and a battery case and is approximately 16 in. long exclusive of thong. The light-barrel is clear lucite around which eighteen 11/16-in. Stimsonite yellow plastic reflector buttons are recessed in three rows of six each. Equal light distribution is accomplished by special lands machined inside the barrel. A black cap is fitted to the top of the light-barrel. The battery case is provided with a filter and a reflector assembly with a standard bulb. The yellow lucite filter, placed over the reflector as-

sembly, gives a light contrasting sharply with road lights.

New Vise for Wire Rope Loops

10. A new vise which forms a loop in wire rope by simply turning one hex nut with an ordinary wrench is now in production by Nunn Manufacturing Co., Evanston, Ill. The vise automatically compensates for rope sizes within its designed range and holds the loop firmly through the splicing or clamping operations. The vise is equipped with a swivel base

that accommodates it in either vertical or horizontal position and rotates through 360 degrees, clamping firmly in any desired direction. Cable-Vise No. 1, illustrated here, takes rope sizes 1/4 in. through 1/2 in. Cable-Vise



Cable-Vise No. 1

No. 2, equipped with hydraulic booster and accommodating rope 5/8 in. through 1 1/2 in. heavy duty will be announced shortly.

BUFFALO-SPRINGFIELD TANDEM

rollers

roll the edges as smoothly as the middle

Look how easy it is for the operator of a Buffalo-Springfield tandem roller to bring the roller up close to curbs, hydrants, or other obstructions without moving from a comfortable position in his seat. Hand tamping is eliminated, operator fatigue is reduced and rolling is uniform from curb to curb. Available in weights from 3 to 14 tons.

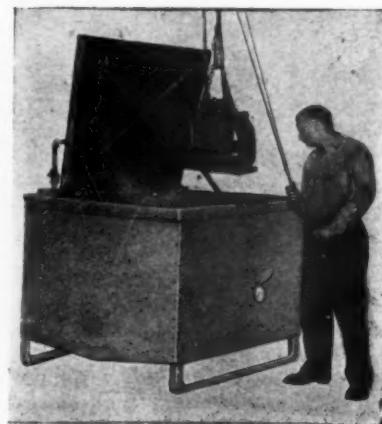


Buffalo-Springfield Roller Co.
Springfield, Ohio



New Cleaning Tanks for Motor Blocks

11. Two new models of motor block cleaning tanks, specifically designed for the degreasing of diesel motors, truck, tractor and similar larger motor blocks, have been brought out by Aeroil Products Co., West New York, N. J. Both models are used in con-



Motor Block Cleaning Tank

This is BALANCED *Power Thrust*



1

Hoist power is applied near the center of the load and directly against the longitudinal sills.

2

Lifting power is distributed by longitudinal sills and cross bolsters under the full length and width of the body.

3

Double, compound-type lift arms prevent sway.

Because of PERFECTION's *Balanced Power Thrust* design, Perfection Dump Bodies give longer service and Perfection Hydraulic Hoists perform more efficiently, with less wear.

Made for all makes and models of trucks. Write for complete information and name of nearest Distributor.

THE PERFECTION STEEL BODY CO.
GALION, OHIO

PERFECTION
TRUCK BODIES AND HOISTS



This name on a reel— means TOUGH WIRE ROPE

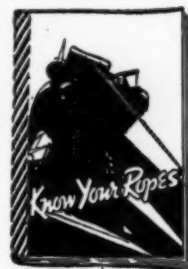
For rugged, long-lasting wire rope be sure it bears the name Wickwire Spencer. Every step in the making of Wickwire Rope is under constant, careful control, from the special formulae used in making the steel, through processing of the wire until it is exact within a fraction of a thousandth of an inch, through laying of the strands and final closing.

Order Wickwire Spencer Wire Rope and be assured of the utmost in performance, safety and long rope life. It is available in all sizes and constructions—both regular lay and WISSCOLAY *Preformed*.

HOW TO PROLONG ROPE LIFE AND LESSEN ROPE COSTS . . .

Thousands of wire rope users—old hands and new—have found "Know Your Ropes" of inestimable value in lengthening life of wire rope. Contains 78 "right and wrong" illustrations, 41 wire rope life savers, 20 diagrams, tables, graphs and charts.

SEND FOR YOUR FREE COPY



Send your wire rope questions to

**WICKWIRE SPENCER
STEEL**

A DIVISION OF THE
COLORADO FUEL AND IRON CORPORATION
EXECUTIVE OFFICES—500 FIFTH AVE., NEW YORK 18, N. Y.

Abilene (Tex.) • Boston • Buffalo • Chattanooga • Chicago • Denver • Detroit
Houston • Los Angeles • Philadelphia • San Francisco • Tulsa • Worcester



nection with the hot dip alkali cleaning process. The units are fully insulated and heated from the inside by means of a patented removable immersion tube system with the burner in a burner "well" within the fully insulated tank. Standard equipment includes built-in dial thermometer, heavy duty removable grilles, scum gutter, sludge drain, draw-off cock, and double braced hinged covers. Provision is also made for automatic heat controls for thermostatic temperature regulation from 100° to 550° F. The equipment may be heated by city gas, manufactured gas, liquefied petroleum

gas or kerosene. Thermostatic controls are electrically operated from any normal lighting circuit.

New Loading Device for Dump Trucks

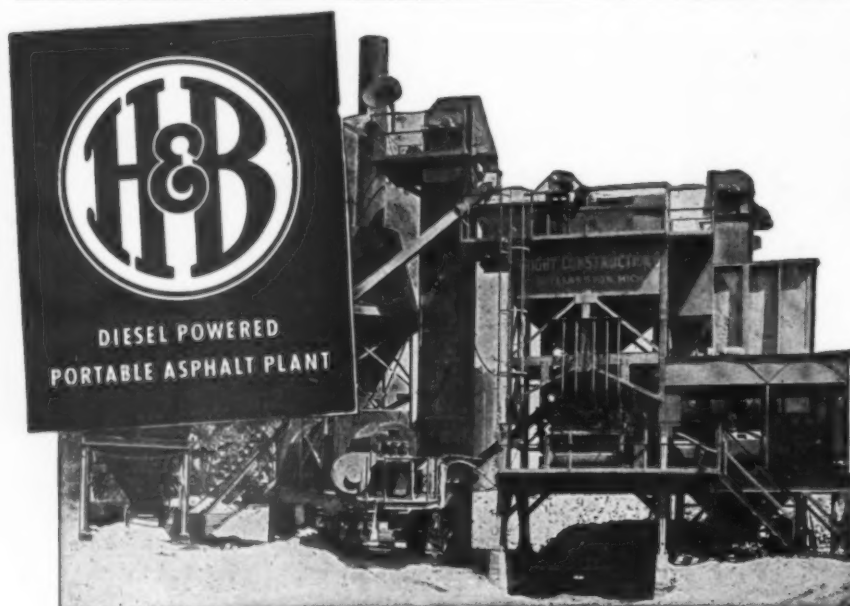
12. A new truck loading device requiring no power plant nor power take-off from the truck motor has been announced by the Cascade Manufacturing Co., Portland, Ore. The device is adaptable to any standard dump truck. The boom, pivoted at its base, swings out over the ditch. The

1/6 cu. yd. scraper is pulled along the ditch while truck travels forward by means of a cable attached to a drawbar which projects out from the truck below the boom. This drawbar is hinged to drop down out of the way when not in use. The hoisting device is a winding drum attached to rear wheel of truck which, by simply backing the truck, supplies the power for



The Scrape-Loader

raising scraper from the ditch and swinging it up over truck body. After scraper has been filled, the truck stops and backs up. A ratchet in the winding drum engages and the drum winds in the line, quickly hoisting loaded scraper up and over truck. By means of a trip-line, the scraper operator guides the bucket to desired unloading position and then trips the load. The truck then travels forward and scraper is returned to the ditch, landing in the exact spot from which it was lifted.



Tops in Asphalt Production



THE MOTO PAVER

The new H & B mixer and paver—self-contained and self-propelled—mixes, spreads and lays any type of mixed-in-place bituminous material to any road width, thickness and crown condition. Write for Bulletin M° 46

This Diesel powered Hetherington & Berner portable asphalt plant is engineered to give the volume, uniformity and economy of production which is needed for profitable peace-time operations. The Diesel power unit permits all units of the plant to be individually motor driven, thus eliminating many chains and countershafts and reducing maintenance costs. It also makes the operator independent of local power sources. Sectional type construction makes for quick assembly and disassembly, and for complete portability.

H & B builds portable and stationary asphalt plants of all sizes, types and capacities. Write for literature on the type of plant in which you are interested.

HETHERINGTON & BERNER INC. • 721 Kentucky Ave., Indianapolis 7, Indiana

Hetherington & Berner

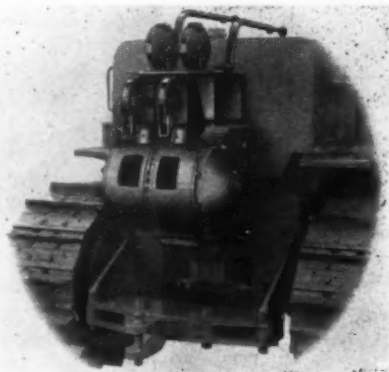


New Electric Fuel Pump

13. A new electric fuel pump suitable for use on passenger cars as either standard equipment or as an accessory as well as for use on trucks and buses has been announced by the Instrument Division of Stewart-Warner Corporation, Chicago, Ill. Designated Model 110-N, the new pump supersedes and out-performs the Stewart-Warner pre-war Model 110-D and is the first electric pump made by Stewart-Warner readily adaptable to passenger car installation as well as for use on trucks and buses. Outstanding advantages claimed for the new Model 110-N pump by Stewart-Warner engineers are that it can be serviced in the field without special tools; has a delivery capacity up to 15 gal. per hour, instead of the 13 gal. of the previous model, and, in operation, it is entirely independent of, and can be mounted remote from, the vehicle's engine.

New Cable Control Unit

14. A new rear double drum control has been announced by Caterpillar Tractor Co., Peoria, Ill. The unit designated as the No. 25, embodies numerous refinements and features designed for the heaviest service imposed on "Caterpillar" Diesel D8, D7 and D6 Tractors in the operation of the largest scrapers, and of bulldozers and rippers. Smoother, easier operation with a minimum of adjustments



No. 25 Cable Control Unit

is featured in the design of the new rear cable control. The multiple disc clutch with metallic facings is the same type used for many years in the company's track-type tractor line, and synchronized brake release and clutch engagement also add to the smooth operation of the unit. The unit is designed to permit rapid free spooling when desired. Other outstanding features claimed for the rear cable control include large-diameter, specially grooved sheaves; large brake capacity; use of anti-friction bearings and recessing of cable drums in the case; compact design which permits mounting close to the tractor; and a rugged cast steel case.

New Grease Gun

15. A new bucket pump known as the "Porto-Pak" has been announced by Lincoln Engineering Co., St. Louis, Mo. This improved high-pressure grease gun is of all steel construction and holds 30-lb. of lubricant. The Porto-Pak features a positive automatic venting device in the pump tube assembly which operates instantly when the pump handle is raised momentarily to topmost position. This venting device relieves pressure in the hose assembly permitting lubricant to drain back into container, saving lubricant and eliminating dripping when coupler is disengaged from the grease fitting. The venting device is wear-proof and has no moving parts or springs.



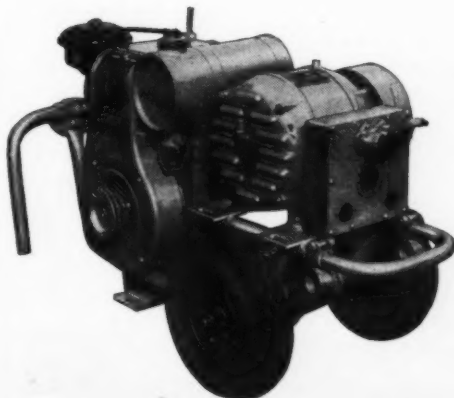
Forward movement requires little more than guidance on part of operator.



Tilted to make a second pass.

Here is, bar none, the most convenient, easy to handle, efficient and economical vibratory hand screed on the market today. One man operates it with ease — the vibratory impulses of the motor cause forward travel and little more than guidance is required. It will work right up to walls, is easily tilted and rolled back for second passes, and can be quickly adjusted over a range of nearly 4 feet without changing plank. Gives complete compaction through full depth of the slab and saves the cost of one man on the job. Model SC-11A — 13 ft. for 12 ft. section. Simple rugged 3 phase motor may be operated from commercial power. But, for a truly record-breaking combination use it with a

JACKSON PORTABLE POWER PLANT



Powered by husky Wisconsin engines and equipped with new type permanent magnet generators which require no adjustment or maintenance, JACKSON Portable Power Plants give you reliable power when and where you want it. They permit instant adjustment of frequency for placing or finishing either highly workable or very dry mixes, and provide both 3 phase and single phase power for operating all types of electric vibrators, lights and construction tools. Available in capacities of 1.25, 2.5, 5.00 K.V.A., 115 Volt, 60 Cycle A.C. (Model M-2, 2.5 K.V.A., shown at the left.)

Write for complete information and name of nearest JACKSON distributor.

ELECTRIC TAMPER & EQUIPMENT CO., LUDINGTON, MICH.

New Self-Propelled Arc Welder

16. Latest models of its "Mobile" type self-propelled arc welders have been announced by The Hobart Brothers Co., Troy, O. Welding equipment consists of a 300 ampere welding generator and tank carriers for oxy-acetylene welding. The door to tool chest in rear becomes a convenient welding and work bench when opened. A Chrysler industrial 6-cylinder engine furnishes power for welding and transportation. Special cable reel has capacity for 75 ft. of both electrode



New Self-Propelled Arc Welder

and ground cable and is optional equipment. Current supplied to the reel permits immediate welding at

any desired cable length. The unit has an automotive type transmission, three speeds forward and one reverse. It is connected directly to the welding generator.

Remote Control for Truck Crane

17. A remote control unit, which enables one man to operate the crane and the carrier from the crane operator seat is now available in the truck cranes of Harnischfeger Corporation, Milwaukee, Wis. With a simple control panel located in the crane cab, the operator can start the carrier engine, operate the clutch, shift gears, steer the truck, blow the horn and apply the brakes without moving from the crane cab. With the control panel set up in the crane cab, a center pin is used to connect this panel with solenoid air valves which control the outlet of compressed air needed to operate the various carrier movements. Thus the power of compressed air, controlled by electricity, is used to actuate each carrier func-



low-cost treatments for secondary roads with

Bituvia Road Tar



Write for
this
manual
today

One of the primary needs in many communities is the immediate improvement of secondary roads, including county and township roads, village streets and, frequently, sections of the State Highway System.

The use of BITUVIA Road Tar for such work gives a low cost road that will be easy-riding and serviceable in all weather. With proper maintenance it will last for years and, when requirements warrant, such a road provides an excellent base for a heavier tar retread or tar plant mix surfacing.

For detailed information on these and other applications of BITUVIA, send for the pocket-size BITUVIA manual.

Reilly Tar and Chemical Corporation

MERCHANTS BANK BLDG. • INDIANAPOLIS 4, INDIANA
2513 S. Damen Ave., Chicago 8, Ill. • 500 Fifth Ave., New York 18, N. Y.



Control Panel

tion. The operating control panel in the crane cab is for the most part an easy to run push-button instrument board. Buttons designated as horn, right and left steering, forward, neutral, reverse, clutch, brake, ignition and starter eliminate any confusion to or complications for the operator. The brake, however, utilizes a pull out switch which allows air to pass through a double check valve to the rear wheel brakes. Hence the rear wheel brakes may be operated by the treadle valve in the carrier cab or through the solenoid valve.

New Battery-Charger

18. A new portable fast battery-charger designed for construction, marine, farm and automotive use has been announced by Thomas A. Edison, Inc., Kearney, N. J. The charger weighs 43 lb. Simple, compact design, plus the use of 16-gauge die-stamped aluminum for the housing, $\frac{1}{8}$ in. aluminum for the chassis base, a



New Portable Battery-Charger

glass-insulated transformer and a selenium rectifier, give the unit its desirable portability. The charger is designed to deliver 80 amperes to a 6-volt battery. It will operate satisfactorily on 105- to 125-volt, 60-cycle, single-phase alternating current.

MANUFACTURERS' LITERATURE

Waterproofing Specification Book

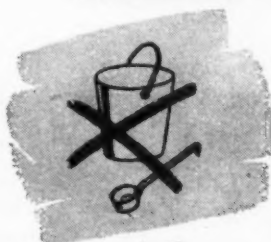
19. A new specification book of Truscon waterproofings, dampproofings and concrete specialties has been issued by Truscon Laboratories, Inc., Detroit, Mich. Book is divided into 3 sections: "Waterproofings," including integral waterproofing and iron waterproofing. "Dampproofings," including clear dampproofing and bituminous dampproofings. "Miscellaneous" section, consisting of transport membrane method for curing concrete, swimming pool coatings, paint for damp walls, shrink proof mortar, admixture for bedding machinery etc. Book is complete with both complete and "short" specifications, illustrations and description of products.

Diesel Nozzle Tester

20. A low cost portable tool that will test all makes and models of diesel nozzles and injectors is described in a bulletin of The Buda Co., Harvey, Ill.

*Clean..
Cool..*
DRINKING WATER!
**For Construction
and
Maintenance Crews**

≡WATER FLOWS INSTANTLY≡
≡AT THE PRESS OF A BUTTON≡
**with this PORTABLE SANITARY
DRINKING FOUNTAIN!**



**Stop GERM
SPREADING PRACTICES!**

Protect the health and strength of your workmen on jobs where *fresh, clean, cool drinking water* is not available . . . stop using unsanitary pails, kegs, dippers and cups. Save payroll losses by keeping your men on the job! This portable drinking fountain (the same as used during the war by the Armed Forces, all over the world) will help you do all this by providing protection for your workmen from disease, colds, etc. which otherwise easily spread when a "common" drinking cup or dipper is used.

Inner water container and bubbler parts made of corrosion-proof stainless steel or plated brass. Four gallon capacity tank, fully insulated to keep water *fresh and cool*. A few strokes with the pump supplies compressed air for instant flow of water at the press of a button. Meets requirements of Public Health Authorities!

**ORDER DIRECT FROM THE
FACTORY . . . IMMEDIATE
DELIVERY!**

No. 18—Dobbins Superbilt Portable Drinking Fountain, less all accessories. Only . . . \$12.50
Salt Tablet Dispenser, 500 tablet capacity, extra . . . \$2.75
Adjustable, Waterproof Carrying Strap, extra . . . \$1.00
Spill Cup, to catch overflow when used indoors . . . \$3.50
Mounting Brackets, holds fountain to wall or floor of buildings, trucks, tractors, locomotive cabs, etc. . . \$4.50
All prices F.O.B. Elkhart, Indiana. Circular on request.



**DOBBINS
MANUFACTURING COMPANY**
Dept. 622
ELKHART, INDIANA

Trencher

21. The model 120 trencher is covered in a new bulletin issued by Buckeye Traction Ditcher Co., Findlay, O. The "120" is a boom type trencher which digs trench from 18 in. to 48 in. wide and up to 11 ft. 6 in. deep. It features a tubular bucket line boom that may be moved from left to right of center for cutting close to obstructions. Boom has a unique telescoping arrangement that provides ready adjustment for cutting either 7 ft., 9 ft. or 11 ft. 6 in. depths, with no sacrifice of strength or rigidity. Complete specifications are given, construction details shown and numerous jobs illustrated. Copies sent on request.

Jaw Crushers

22. A new bulletin on Universal welded base roller bearing jaw crushers has been issued by Universal Engineering Corporation, Cedar Rapids, Ia. The WRB series are overhead eccentric type jaw crushers with rugged welded steel plate bases and S.K.F. roller bearings. They are made in 10 in. x 16 in., 20 in. x 36 in., 24 in. x 36 in., and 30 in. x 42 in. jaw openings. Structural details and complete specifications are given.

Off-the-Highway Tires

23. A photographic review of the technique and care that goes into the construction of huge off-the-highway tires is given in a manual just issued by The Firestone Tire and Rubber Co., Akron, O. The manual explains the specific purpose for which various tread patterns are designed, and gives complete information on care and inflation. Suggestions are also made regarding the importance of correct brake adjustment, storage of tires, and repair of damaged tubes and valves. There are tables on the weights of various materials per cubic yard, on load inflation and in the size and kind of tires recommended for every type of construction equipment.

Mobile Machine Shop

24. Its new mobile machine shop is illustrated and described in a booklet issued by Davey Compression Co., Kent, O. The booklet emphasizes that the shop, mounted on standard trucks, includes all of the equipment ordinarily assembled in large central repair depots. Basic power units are a 60 c.f.m. Davey Compressor, 300 Amp. welding generator, and 5 KW power generator.

Soil Moisture Determination

25. An illustrated descriptive leaflet has been issued by Service Engineering Co., New York, N. Y., on a 6-minute process for determination of moisture in soils. The process was devised by Herbert P. Pearson, Manager of Soilpak Division, Service Engineering Co., New York, and Carl Bussow of A. W. Dow, Inc., of New York. The determination is done by combining the moisture with calcium carbide and displacing water in a graduated cylinder with the liberated acetylene. The apparatus is found in most chemical laboratories and costs less than \$20.

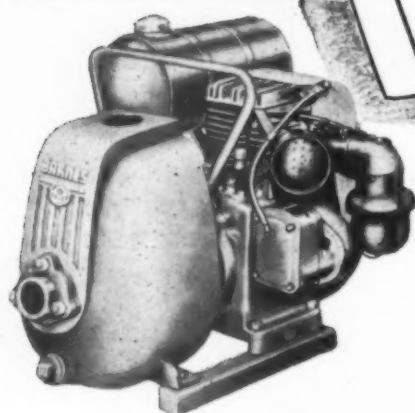
Floodlight Unit

26. An illustrated data sheet carrying full specifications on the design, construction and operation of the new Consolidated gasoline-driven floodlight unit has been issued by Consolidated Diesel Electric Corporation, Mount Vernon, N. Y. Independent "on-the-spot" light and auxiliary power are provided by this wheel or skid mounted unit. It furnishes 120 volt, single phase and 208 volt three phase current to four 1000 W. adjustable, wide-diffusion lamps.

YOU CAN DO THE JOB BETTER—FASTER—CHEAPER

WITH THESE

"33,000 for 1" Pumps



The Streak (7M) 2-inch
STOCK DELIVERY ON THIS PUMP
NO WAITING—NO DELAY

Complete line of pumps ranges in size
from 3,000 gallons per hour to 90,000
gallons per hour.

PUT Barnes Automatic Centrifugal Pumps to work on a hundred and one different jobs around construction, building, and road projects, and you will do your pumping better, faster, and cheaper.

For Barnes Pumps are the "33,000 for 1" Pumps. They deliver not 1,000! — not 10,000! — but 33,000 gallons of water for one gallon of gas used! That's economy of operation. They have stepped-up capacities. That's faster delivery. They are lighter in weight. That's better and easier handling. And they are built to stand the gaff.

Remember these better Barnes "33,000 for 1" Pumps when ordering or specifying portable, self-priming centrifugal pumps.

For sale by leading distributors in all principal cities.
If there is no distributor near you,
write, phone, or wire.



BARNES MANUFACTURING CO.
Quality Pump Manufacturers for 50 Years MANFIELD, OHIO



Concrete Pavement Design, New Manual

27. The Portland Cement Association has issued a 108-page booklet, "Concrete Pavement Design," which replaces the well-known booklet, "Concrete Road Design, Simplified and Correlated with Traffic" (1933) by Frank T. Sheets, then consulting engineer and now president of the association.

Representing years of research and experience in pavement design, this booklet makes the engineer realize how much of the need for guesswork or rule-of-thumb methods is eliminated today in designing street or highway pavements. The manual presents in workable form much of the data needed by the busy practicing engineer. No unproved principles are involved.

Of particular interest is the inclusion of new design formulas. Tables and explanatory text enable the engineer readily to compute slope and edge thickness of thickened edges required in a balanced design. Economic data on pavement design are also given, including tables summarizing and comparing different cross-sectional designs for heavy and medium-heavy primary traffic.

Also new is a chapter on methods of measuring and evaluating sub-grade supporting power, which is recognized as an important consideration in all pavement design. Eighteen design charts, giving pavement stresses for various wheel loads and values of d are included for values of k ranging from 50 to 500.

The booklet, "Concrete Pavement Design," is available free on request to Portland Cement Association, 33 West Grand Ave., Chicago, Ill.

Cranes

28. One-man aerocranes are described in a 16-page catalog issued by Orton Crane & Shovel Co., Chicago, Ill. Two separate tables give general dimensions of all 7 models and the normal working capacities of these models at an operating radius of 9 to 50 feet. A third table lists the weights of rehandling and excavating clam-shell buckets loaded with various kinds of loose materials.

Front End Material Spreader

29. A spreader that distributes cinders, sand and rock chips ahead of the front wheels of the truck thus affording better traction on icy roads is illustrated and described in a circular of the St. Paul Front End Material

Spreader Co., St. Paul, Minn. The various pictures of the spreader are pictured and described. Specifications are included.

Portable Primary Crushing Unit

30. The 546-P primary crushing unit and its application are covered in a new bulletin released by Universal Engineering Corporation, Cedar Rapids, Ia. The new bulletin describes not only the plant itself, but also contains detailed information concerning its use in various types of set-ups for the production of aggregates, aglime, etc.

Jacks

31. All the various models and types of Buda ratchet, screw and hydraulic jacks are illustrated and described in a new bulletin issued by The Buda Co., Harvey, Ill.

Motor Vehicle Receipts Increase— State motor vehicle receipts last year, including registration fees and miscellaneous collections, amounted to \$440,341,000, as compared with total receipts of \$419,479,000 in 1944. Registration fees amounted to \$385,694,000, an increase of \$12,544,000 over 1944 registration receipts.

25,000 Miles of CALCIUM CONSOLIDATED ROADS show the way

Hundreds of communities have found the way to get more miles of better roads for less money with calcium chloride for surface consolidation.

Such roads are built of local materials, by local labor, under local supervision and, when consolidated with a moisture bond provided by calcium chloride, are real, scenic highways—smooth and dust-free.

The road shown has been in

service for eight years as a secondary state route. Its cost was low, its maintenance cost very low. Its surface is firmly bound and long-wearing.

When you build or improve secondary roads under the new Federal-Aid program, investigate this high type of low-cost road.

Ask for our booklet, "Surface Consolidation and Maintenance with Calcium Chloride."

CALCIUM CHLORIDE ASSOCIATION 4145 Penobscot Bldg., Detroit 26, Mich.



More Miles of Better Roads —

CALCIUM CHLORIDE

Consolidation

(Continued from page 77)

the construction, operation and maintenance of air navigation facilities, such as radio communications stations, air traffic control centers and towers, instrument landing systems and the like.

Few Inspectors

Only 836, or 8% of all CAA employees, are engaged in all phases of safety regulation work. This group carries the heavy responsibility of inspecting for safety every civil aircraft that is flown, from the time a manufacturer seeks an approved type certificate for the prototype until the

plane has completed its years of service and can no longer pass the CAA annual inspection for airworthiness. They also pass upon the competency of applicants for certificates as pilots, mechanics, control tower operators and other types of airmen and air agencies.

To make possible prompt inspection service for the rapidly mounting numbers of airmen and aircraft without burdening the taxpayer, the CAA currently is delegating responsibility to qualified persons in the industry. By the end of the year, there will be approximately 1,000 "deputies" who are authorized to inspect aircraft and

2,000 who can give flight tests.

Serves Nation's Schools

In addition to airways and safety regulation activities, CAA maintains a small Office of Aviation Training which in the last four years has been responsible for stimulating and assisting about half of the nation's high schools to introduce aeronautics studies. This office also conducts the Inter-American Aviation Training Program for pilots, mechanics and airways technicians from the other American republics.

The CAA Office of Airports directed the Defense Landing Area program, which built more than 500 large airports since 1940 at a cost of \$400,000,000. Meeting primarily the requirements of the armed forces, these were located wherever possible to be of continuing use in peacetime. The CAA Office of Airports will have the task of fitting these fields into the \$500,000,000 national airport program now pending in Congress, under which CAA would match local contributions for building some 3,000 new landing areas and improving 1,600 others.

CAA World-wide

The world-wide growth of U. S. air operations during the war and the prospect of continued heavy international flying on a civil basis has prompted establishment of the CAA Office of Field Operations which coordinates foreign activities of the organization. It is expected that a total of 16 foreign offices will be established in the future; three are already in operation, at Rio de Janeiro; Lima, Peru, and Balboa, C. Z.

The overseas responsibilities of CAA have been increased greatly by the President's recent order transferring to the Department of Commerce responsibility for airways aids outside the United States which have become surplus to the armed forces.

Tenfold Increase in Airports Since 1926

but booming aviation still needs more

Twenty years ago there were about 400 airfields in the United States listed as "reliable despite rotation of crops." Only about three of these had paved runways, and none exceeded about 3,000 ft. in length.

Today there are more than 4,000 airfields—a high percentage with paved runways, lighting equipment for night operations, and control towers to direct traffic.

Yet today's airfields are as inadequate in numbers as those of 1926. Aviation has taken such giant strides in the interval that today's crying

100% Self-Contained



SYNTRON

Gasoline Hammer

PAVING BREAKERS

BUST Concrete

CUT Asphalt

DIG Clay and Shale

TAMP Backfill

EASIER — FASTER — CHEAPER

Not a toy—but a man-sized hammer that will do a man-sized job.

A sturdily-built, hard-hitting hammer that will save you **MONEY, TIME AND LABOR** on those close-figured jobs.

Write for literature.

SYNTRON CO.

384 Lexington

Homer City, Pa.



THAT'S
SYNTRON

need, like that of 20 years ago, is more airport facilities in convenient locations.

CAA's History

Throughout its history, the CAA and its predecessor organizations have had two principal aims as to airports. First, the design and construction of airports adequate in size and facilities for safe operation which was the responsibility of the airport division. Although the law gave the federal men no positive power with which to enforce their standards, they were able through close cooperation with municipalities and with airport engineers to avoid the building of unsafe airports. The second aim was to see that every airport contributed directly to a national airport system. The growth of the airlines and the construction of new airways were guiding factors in this aim.

Between 1925 and 1930 the enthusiasm of the promoters of aviation resulted in several spurts in airport building. The Ford Reliability tours, starting from Detroit and making large swings about the country, dramatically called attention to the possibilities of the airplane for personal and freight transportation, and resulted in many a city bond issue for

airport construction. The flights of Lindbergh and others promoted interest in more airports.

The work relief programs of the depression times proved a boon to airport construction. Through the WPA, the ERA and the FERA, many a city and town obtained an airport. Like any other public utility, the airport is a good item in a public works program.

The greatest spurt in airport construction came, however, in World War II, when the military had to consider the need for airports for possible defense of the country against aerial attack, and the facilities needed for training quickly the largest air force in the world. Several agencies built airports. The CAA built 525, at a cost of \$400,000,000. There was an important feature of this program, however, in that the CAA attempted to locate these airports so they would be valuable for civilian use after the war. Thus, the CAA was able to build war facilities for future peacetime use, and the cities which cooperated agreed to operate these fields for the benefit of all the people.

As a result, we now have an excellent start in providing the large airports we need. The CAA's National

Airport Plan proposes 3,000 new airports of which 2,900 will be small ones for the use of private fliers.

Terminal Problem Acute

In some respects, however, the terminal airport problem today is more acute than ever. The growth of airline schedules now brings up the question of multiple airports at certain cities, or the construction of an entirely new and larger commercial airport.

Air traffic congestion in the New York City area, particularly in bad weather, sometimes grounds commercial flights as far away as Richmond and Cleveland. This is a foretaste of what we can expect in busy areas throughout the nation as passenger and cargo operations expand—unless airport expansion is rapid.

Private flying is being severely handicapped by lack of landing facilities within the limits of big cities. Suppose a man with a private plane wants to visit a city 100 miles away. It may take him an hour to get his airplane, hangared at a field far from his home. The flight itself might take an hour. When he reaches his destination, it may take him another hour to get into the business section of the town he is visiting. For prac-



SHANTIES are out of style

It's good business to keep your small utility buildings out of the shanty class. You can do it at low cost and get much better structures by specifying standard ARMCO STEELOX Buildings.

This way your garages, tool houses, field offices and other buildings have the two big advantages of a permanent structure—long life and low upkeep—plus easy portability should conditions change.

STEELX Buildings are adaptable to many requirements. They can be quickly wired, easily insulated, or may be left uninsulated without affecting weather-tightness. All-steel construction is an excellent fire-barrier, while interlocking joints help keep out dust and vermin. The galvanized PAINTGRIP surface of STEELOX can be painted immediately—assures long paint life.

STEELX Buildings are prefabricated in a wide range of standard sizes. They are easy to handle and are erected quickly by unskilled labor. When necessary they can be quickly dismantled and re-erected at another location.

Write for prices and complete information on standard ARMCO STEELOX Buildings. Armco Drainage & Metal Products, Inc., and Associated Companies, 2465 Curtis Street, Middletown, Ohio.



ARMCO
STEELX BUILDINGS



tical purposes, this man's trip was made at an average of only about 33 miles an hour, instead of the 100-mile-an-hour speed of his airplane. In addition, he has suffered inconvenience at both ends of the journey. The solution is obvious—more and more conveniently-located airports.

The Office of Airports of the CAA stands today on the verge of one of the largest airport building programs in history, even including the wartime program. Even before Congress had decided on the principle of 50-50 matching of federal funds by cities and states, hundreds of new fields were being planned and constructed by returning service men establishing small businesses, and other hundreds of fields closed by the war were being re-opened. This privately-financed activity is expected to continue, and even to be increased by the government program.

(Continued from page 87)
creases the compressive strength of the soil structure.

4. In reducing the moisture content and increasing the compacting force, points are reached where further change in those directions cause a reduction in the compressive strength of the soil structure.

5. Compacted, integral, clay soil structures conform with Hook's Law,

in that the ratio of stress to strain is constant up to a certain point and then, as applied load is gradually increased, the vertical deformation begins to increase in a faster ratio than the applied load.

6. The unit stress at which the deformation begins to increase in a faster ratio than the applied load is the elastic limit of the compacted clay soil structure.

7. The elastic limit of a compacted, integral, clay soil structure is well defined and can be determined in a practical way in the laboratory, as compared with the elastic limits of other commonly used building materials.

8. For the present, in designing roadway clay soil substructures, the working unit-stress should not exceed 50% of the elastic limit of the compacted soil structure.

9. The elastic limit of clay soils compacted in place in roadway substructures can be determined in a practicable way in the field, by using the same general principles used in the laboratory.

Planning Engineer Wanted

The city of Madison, Wis., has an opening for a planning engineer to work under the general direction of the City Plan Commission. Salary \$300 to \$350 per month, plus a \$24

per month present cost-of-living salary adjustment. Applicant should have three years' experience (1) as a civil engineer, including not less than two years in state, county or municipal planning work; or (2) in fields relating to city planning; graduate civil engineer or specialization in subjects relating to city planning.

Tentative closing date for filing application is July 15, 1946. Application forms may be obtained from the Personnel Department, City Hall, Madison 3, Wis.

"Soils, Concrete and Bituminous Materials"

The lecture notes on soils, concrete and bituminous material for a course for officers of the British fighting services engaged in the construction of roads and airfields have been collected into a book. The book consists of 300 pages and is illustrated by 160 photographs and diagrams. It is published by H. M. Stationery Office, London, England, for the Road Research Laboratory of the Department of Scientific and Industrial Research and is priced at \$2.40 net. The book was published for official use during the war, but the demands for copies have been so numerous that it has been decided to reprint the book and make it available generally.

FAST NON-STOP SPREADER

Doesn't Limit Use of Truck to Spreading alone

- Enables you to get icy spots covered faster
- Speed to danger spots, start spreading without stopping truck
- Finish spreading—speed on to next spot without stopping truck
- Operated entirely by driver with clutch control in cab
- Spreads all granular materials up to 1", wet or dry
- Spreads forward or backward—full or half width of street
- Does not limit use of truck—won't interfere with dumping
- Attaches to truck as a tailgate, off in 5 min.





Flink Model WD31 Spreader with new safety protective housing over spreader blades and clutch.

USE FEWER MEN, TRUCKS, TIME

New simplified construction, installation and maintenance, new ease of operation . . . but basically the same practical, economical, efficient Flink spreader that has proved itself in a thousand tough road construction and maintenance jobs . . . in ice control and dust control all over America. Write for complete information.

FLINK COMPANY, DEPT. 8, STREATOR, ILL.

WITH THE MANUFACTURERS & DISTRIBUTORS

Le Roi to Make Rock Drills

The Le Roi Co., Milwaukee, Wis., has announced the formation of new manufacturing operations to be known as "The Cleveland Division." This division will produce a complete line of rock drills and related pneumatic equipment to serve the construction, mining and transportation industries, thus complementing the company's complete line of portable compressors which have been manufactured and refined over a period of 25 years. A modern plant equipped with the latest types of machine tools, modern metallurgical, heat treating and testing facilities will be located in Cleveland. Final design and testing have been completed on several series of tools and production is scheduled to begin immediately. Russell R. Morgan, a former officer of The Cleveland Rock Drill Co., heads the Cleveland Division.

Rollin Heads Pioneer Service

Expanding an already important phase of its operations, Pioneer Engineering Works, Minneapolis, Minn., has announced the consolidation of all its service activities under Harold E. Rollin, Manager, Sales Engineering. Mr. Rollin entered the employ of Pioneer in February, 1929, as a draftsman, later became Chief Draftsman and subsequently Chief Engineer. During the war he served as night superintendent of the shops and in November of 1945 was named Manager, Sales Engineering.



H. E. Rollin

New Lima Distributor

Lima Locomotive Works, Inc., Shovel and Crane Division, Lima, O., has appointed Stanley & Cadigan Co., Portland, Me., as sales agent for Lima shovels, cranes and draglines in the state of Maine.

Appointment of the Wylie-Stewart Machinery Co., 1400-1426 Exchange Ave., Oklahoma City, Okla., as sales agent for Lima shovels, cranes and draglines in the state of Oklahoma has been announced by Paul R. Ehrigott, general sales manager, Shovel and Crane Division, Lima Locomotive Works, Incorporated, Lima, O.

Peck Now Sales Manager for Sika

Sika Chemical Corporation, 35 Gregory Avenue, Passaic, N. J., has announced the appointment of E. J. "Al" Peck as sales manager. He has had long experience in selling construction materials, having recently been sales manager of the Hilty Forster Lumber Co., Milwaukee, Wis., and prior to that for twelve years with the Johns-Manville Sales Corp. In his new position he will supervise the promotion and sales of the compounds for concrete problems manufactured by Sika.



E. J. Peck



CITY STREETS REQUIRE PAVEMENTS TO BE IN SOLID CONTACT WITH RAILS.

Servicised

PREMOLDED RAIL FILLER FOR TRACK INSULATION

MUFFLES NOISE BY
DIMINISHING VIBRATIONS!

← Holds Rails Solid, But in Resilient Contact With Pavement.

Servicised—Bituminous Resilient Rail Filler Cuts Down Maintenance Costs for Both City and Railway Company by Eliminating Expansion & Contraction Damages.

NATURE OF OUR RAIL FILLER

Through many long years of successful service our resilient Rail Filler has more than proved its inherent value to both city and Ry. company. Waterproofing spaces between rails and pavement have prevented infiltration, freezing, cracking and costly deterioration; also eliminating problems of vibration, noise, contraction, expansion and costly re-alignments. Street Railway Systems are possibly the largest users of Servicised Rail Filler, but it is also frequently used where interstate or interurban railroads run in contact with city pavements for distances of a few blocks to several miles.



SERVICISED PRODUCTS CORP.

6051 WEST 65TH STREET

CHICAGO 38, ILL.

Means Appointed Sales Manager

Stanley D. Means has been appointed to the newly-created position of domestic sales manager of R. G. LeTourneau Inc., Peoria, Ill. He will have responsibility over all LeTourneau sales in the United States, Canada, Hawaii and Alaska. His duties will include management of Le Tourneau's Eastern, Central, and Western Sales Territories, and Governmental Sales, as well as continued personal supervision of Industrial Sales. Mr. Means has been affiliated with the Sales Department of R. G. LeTourneau, Inc., for the past 10 years. First appointed as a field engineer, he has served as district representative, training manager, federal sales representative, and government sales manager. In April, 1942, he was appointed manager of the Washington, D. C., office. He returned to Peoria in 1945 as industrial sales manager.



S. D. Means

Alexander Mayer Dies

Alexander Mayer, head of the Piling Department of Caine Steel Co., Chicago, died May 8, after an illness of several months. Mr. Mayer was widely known throughout the construction industry, for his pioneer work in developing Corr-Plate steel piling and promoting its more extensive use. Arthur B. Mayer will continue in charge of the Caine Corr-Plate Steel Piling Department, carrying on the work he handled during his father's illness.

Rosse Appointed Export Manager

Matthew R. Rosse has been appointed export manager for the Colorado Fuel & Iron Corporation, including all divisions and subsidiaries. He has been export manager of Wickwire Spencer Steel, a division of the Colorado Fuel & Iron Corporation since 1943. Previously he was associated with the American Chain and Cable Co. His headquarters will continue to be located at 500 Fifth Avenue, New York 18, New York.

Appointed Sales Promotion Specialist

The Construction Equipment Division of the Worthington Pump and Machinery Corporation has announced the appointment of George H. Allen as sales promotion specialist for



G. H. Allen

Blue Brute Rock Drills to the Mining Industry. Mr. Allen comes to this position after 42 months of service with the Army Air Forces from which he was separated as a Lt. Colonel. Mr. Allen has a wide acquaintance in mining circles and has several years of experience selling mining equipment.

New Distributor for Davey

Jenkins & McCloud, Reno, Nev., have been appointed distributors for Davey Compressor Co., Kent, O. They will handle the complete Davey equipment line.

**LOW COST!
DUST FREE!**

**CITY STREET SOIL-
CEMENT BASE with**

**ARIENS
AGGMIXER**



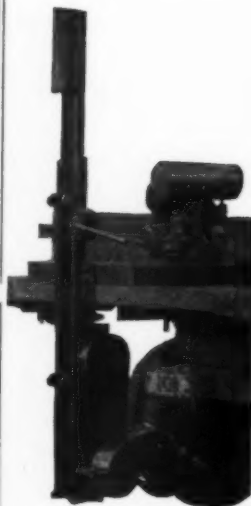
ARIENS AGGMIXER is equipment designed especially for mixed-in-place construction, and to operate in connection with other general purpose equipment, being used wherever aggregates are used, such as all types of bitumens, clays, cements, chlorides, etc. These materials are mixed without being displaced

It's the swirling, chopping action of these tines that does a thorough job of mixing, wet or dry.

on the road surface, the AGGMIXER thoroughly pulverizing, mixing and aerating the aggregates with the binder used, rapidly and economically. Safe and easy to operate . . . adjustable to any tractor . . . made in four sizes, with normal cutting widths 4', 5', 6' and 7'.

Write for complete job facts and name of nearest distributor.

ARIENS COMPANY
BRILLION, WISCONSIN



**NOW
THE MODERN
SPENCER POWER
DRIVEN STEEL POST
DRIVER**

Does the work of 8 men with only 2 men. THEY HAVE BEEN PROVEN IN THE FIELD. SEVERAL STATE HIGHWAY DEPTS. HAVE USED THEM THIS SEASON.

ALSO
COUNTY HIGHWAY DEPTS. HAVE USED THEM FOR TWO YEARS AND ARE ENTHUSIASTIC USERS.

Power take-off
or
Motor Driven.

Will drive 1,000 to 2,000 snow fence posts per day with only two men and with less labor than they would do it by hand. Simply load up the truck with posts and while they are being distributed, in very little more time they can be driven. Mounts on truck or tractor. Saves posts, trucks, labor, and time at the season when they all are so necessary. Write for full particulars and further information.

Distributed by:

MURRAY SALES, INC.

302 Insurance Exchange Building,
Sioux City 13, Iowa

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Allen

Mining
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which he
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Portland Cement Association Appointments

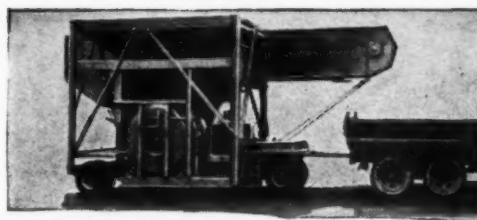
F. E. Votaw has been appointed district engineer in charge of the Boston office, with headquarters at 10 High St., Boston 10, Mass. He will have charge of Association activities in New England. He has been chief field engineer of the Association in the Boston area since 1941. He joined the Association staff as a field engineer in 1935.

Appointment of Robert W. Winters as manager of the West Central Offices of the Portland Cement Association has been announced together with the appointment of Edward J. Mueller to succeed Mr. Winters as district engineer of the Association in Kansas. Both men will make their headquarters at 1627 Dierks Bldg., Kansas City 6, Mo. Since 1942, Winters has been district manager in charge of Association activities handled by the Kansas City and Oklahoma City district offices. He served as district engineer in Oklahoma City for seven years previously. His new duties include supervision of Association work handled by the St. Louis, Oklahoma City, Kansas City, Omaha and Denver district offices. Mr. Mueller, new Kansas district engineer, has been a field engineer for the Association since 1928, serving in Kentucky, Kansas and Oklahoma.

James D. Piper has been appointed district highway engineer of the Portland Cement Association with headquarters at 1016 Tower Petroleum Bldg., Dallas 1, Tex. He will direct the Association's highway, bridge and paving activities in Texas. Mr. Piper has served the Association successively as field engineer in the Oklahoma City office, structural field engineer for the northern half of Texas and district structural engineer. C. A. Clark, the district engineer in Texas, with headquarters at Austin, will continue in charge of Association work other than in the highway field.

Thew Elects Directors

At a meeting of the shareholders of The Thew Shovel Co., Lorain, O., held April 16, 1946, affirmative action was taken on a resolution to amend the company code of regulations to provide for a flexible number of members on the company directorate. This amendment cancelled the former requirement of five directors and permitted action by the shareholders in increasing the number of directors for the ensuing year to a total of eight. The following were elected to serve on the new board of directors: Chauncey B. Smythe, president, Elyria, O.;



30* CU. YD.-HR PORTABLE CONCRETE PLANT



Write for Data

STRAYER Portable CONCRETE PLANTS

Erle Steel Construction Co., 366 Geist Rd., Erle, Pa.

BUCKETS • AGGREGATORS • PORTABLE CONCRETE PLANTS

CAPACITY OF PLANT

Up to 30 cu. yd./hr depending on mixing time.

CAPACITY OF MIXER

Full 3/4 cu. yd. with 10% surcharge capacity.

CAPACITY OF BIN

20 Cu. Yd. heaped 3 equal compartments.

CAPACITY OF AGGREGATOR

Full 3/4 cu. yd. with suspension type scale.

CAPACITY OF ELEVATOR

60 Tons/HR handling material weighing 100lbs. per cu. ft.

OPERATING CONTROLS

All Mixer Bin and Aggregator Gates hydraulically operated with control levers banked at operator's position.

* 40 Cu. Yd/HR Plant also available.

LACLEDE WELDED DOWEL SPACERS



RIGID - ACCURATE

FOR CONTRACTORS, LACLEDE DOWEL SPACERS provide a light weight, economical method of placing dowels and joints. Distribution bars, supports, and dowel sleeves are all welded into one integral unit for rapid joint assembly. Shaped tie wires accurately locate fibre or steel joint materials.

FOR ENGINEERS, LACLEDE DOWEL SPACERS provide a rigid, accurate, prefabricated assembly for holding each end of each dowel in exact location. Both horizontal and vertical alignment of the dowels can be maintained on even the most irregular subgrades within limits prescribed by highway engineers.

LACLEDE STEEL COMPANY

ARCADE BUILDING

SAINT LOUIS 1, MISSOURI

When writing advertisers please mention —> ROADS AND STREETS, June, 1946

WISCONSIN
HEAVY-DUTY
Air-Cooled
ENGINES
on the job
WASHING GRAVEL...



Photograph courtesy of
 Diamond T Motor Car Co., Chicago, Ill.

The above typical service application shows a Wisconsin single cylinder air-cooled engine on the job, in a gravel dredging and washing operation in Mendicino County, Cal.

Wisconsin single and 4-cylinder air-cooled engines, from 1 to 31 hp., are giving good accounts of themselves in a great variety of applications, on many types of contracting and industrial equipment where heavy-duty serviceability and freedom from cooling troubles and attention are important operating factors. Specify Wisconsin Power for your equipment.



WISCONSIN MOTOR Corporation
 MILWAUKEE 14, WISCONSIN
 World's Largest Builders of Heavy Duty Air-Cooled Engines

IT'S SPEEDY
IT'S VERSATILE
IT'S ECONOMICAL



Burch TRUK-PATROL can be used the year-'round!

Ideal for average road patrol, shoulder maintenance and shallow ditch cleaning. Speedily removes ice and slush in winter months.

Two "feathertouch" Hydromotors control cutting edge and two more control moldboard.

Send for bulletin R-66.

THE BURCH CORPORATION
 CRESTLINE, OHIO
 Equipment since 1875

Alan W. Smythe, vice president and general manager, Elyria, O.; David L. Johnson, Cleveland, O., member of the firm of M. B. and H. H. Johnson, general counsel for the company; Reuben B. Miller, secretary-treasurer, Lorain, O.; Arthur C. Lundgren, director of purchases, Lorain, O.; Everett W. Johnston, general works manager, Elyria, O.; Don G. Savage, general sales manager, Lorain, O.; Waid V. Clark, controller, Lorain, O.

Personnel Changes by International Harvester

W. C. Schumacher, general manager of International Harvester Co.'s motor truck division, has announced the appointment of W. K. Perkins, former assistant manager of sales, as manager of sales. At the same time announcement was made of the appointment of J. T. Sullivan, former motor truck branch manager at Portland, Ore., as central district sales manager to succeed W. A. Riggs, who has been transferred to the northwest district. Mr. Riggs replaces R. R. McDonald as northwest district sales manager. Mr. McDonald has been appointed manager of the newly established motor truck branch at Salt Lake City.

Changes Advertising Personnel

J. K. Beeson, executive vice president, Pittsburgh Steel Co., announced May 17, 1946, the absorption of the sales promotion department by the sales department following the resignation of Elmer T. Wible, former manager of product promotion. Advertising authority is now vested in the vice president in charge of industrial and public relations, Garrett A. Connors, whose function has been enlarged to include this phase of the company's activities. Lester W. Gaupp has been named office manager-advertising. Smith, Taylor & Jenkins, Inc., Pittsburgh, Pa., continues as advertising agency.

Perelle New President Gar Wood

Charles W. Perelle, formerly vice-president in charge of manufacturing of Consolidated-Vultee Aircraft Corp., who rose in seven years from a \$175-a-month tool designer to be a \$75,000 - a - year



C. W. Perelle

vice-president of Hughes Tool Co., has been elected president of Gar Wood Industries, Inc. A native of Alaska, where his father was a mining engineer, Mr. Perelle broke into the aviation industry in 1930 as a painter's helper at Boeing at 40c an hour. Seven months later, he was "promoted" to be a riveter's helper at 35c an hour. He later became a tool designer. He joined Vultee in August, 1940, as general superintendent and was made general manager of its Vultee Field Division only five months later. Less than a year after this, he was elected vice-president in charge of production of the merged Consolidated-Vultee Co., and then vice-president in charge of manufacturing. In August, 1944, he took the job with Hughes Tool Co.

Changes Name

The name of Coaltoter Conveyor Co. (Not Inc.), 310 S. Michigan Ave., Chicago, Ill., has been changed to Material Movement Industries, effective May 15. According to Horton Conrad, managing partner, the name was changed to more accurately portray the breadth of the company's equipment and activities in the material-handling field.

so-they went to **ROGERS** for the **WORLD'S GREATEST TRAILER**



Above trailer with actual 600 ton capacity, was built for Eicheley Engineering Corp., and sold by Atlas Equipment Co., both of Pittsburgh, Pa.

and to the solution of their problem of transporting a 300 ton burden in conjunction with a SECRET military test.

In the face of unprecedented problems, Rogers designed, built and delivered in 30 days, a trailer 39 feet long and 17 feet wide.

Sixty-four 14.00" x 27" tires, mounted in banks of eight on axle units, permitted full oscillation, conforming with uneven desert terrain and equal load distribution over all tires.

WRITE FOR THE ILLUSTRATED CATALOG



EXPERIENCE
builds 'em
PERFORMANCE
sells 'em

ROGERS BROS. CORPORATION
110 ORCHARD ST., ALBION, PENNA.

International Truck Personnel Changes

International Harvester Co., has announced the following changes in motor truck personnel: E. H. Watkins, formerly manager, Syracuse, N. Y., motor truck branch, has been appointed assistant manager, motor trucks, Eastern District; R. R. Slater, formerly assistant manager, Boston motor truck branch, succeeds Mr. Watkins as manager of the Syracuse motor truck branch; J. H. Shafer, formerly assistant manager, Los Angeles motor truck branch, has been appointed manager of the Portland, Ore., motor truck branch; G. D. Partidge has been named assistant manager, Cleveland motor truck branch; L. A. Hanson, formerly assistant manager, Springfield, Mo., branch, has been appointed manager at Wichita motor truck branch; W. G. Schendel, formerly assistant manager at Harrisburg motor truck branch, has been transferred to the Buffalo truck branch in the same capacity; G. D. McCarthy, formerly assistant manager at Philadelphia motor truck branch, and D. G. Barrett, formerly assistant manager at Buffalo motor

truck branch, have been transferred to Boston as assistant managers of the motor truck branch.

J. F. Heil Elected President Heil Co.

Joseph F. Heil has been elected president of The Heil Co., Milwaukee, Wis. Julius P. Heil, founder of the company and president since its inception, will continue actively in the business as director and treasurer. Ever since Joe came to the company fresh from university in 1923, J. P. has been grooming him for the leadership and responsibility of the presidency. After eight years of progressive training in practically every phase of the business, Joe was made vice president. When Julius P. Heil was elected Governor of the State of Wisconsin in 1938 and again in 1940, much of his time was necessarily devoted to matters of state and Joe was advanced to



Joseph F. Heil (left) and his father, Julius P. Heil

the active management of the company as executive vice president.

New Factory Branch for LaPlant-Choate

To provide an adequate supply of parts and increasingly better service for users its earthmoving equipment in the western area, LaPlant-Choate Manufacturing Co. Inc., Cedar Rapids, Ia., has established a factory branch at 1022 77th Ave., Oakland, Calif. The new branch, which replaces the company's former facilities at San Leandro, Calif., will include the sales, service and parts headquarters for seven western states, in addition to Alaska, the Hawaiian Islands and the Province of British Columbia in Canada; and will be in charge of S. I. Harris, western division sales manager.

Keener Heads New Division

Ward Keener has been elected to the office of vice-president for Employee Relations of The B. F. Goodrich Co., Akron, O. In this new capacity, Mr. Keener, formerly assistant to the president, will head a new division responsible for all employee relations activities throughout the company's world-wide organization.

On most jobs When Excavating is Necessary



You'll most likely come face to face with one or more Owen buckets, should your travels take you to an excavating job.

The reason why is most simple, for consistent superior bucket performance by Owens is responsible for their widespread use and acceptance.

Bring your equipment catalog files up to date NOW by requesting your copy of the latest Owen Catalog.



The OWEN BUCKET Co.

6070 Breakwater Avenue Cleveland, Ohio

Branches: New York Philadelphia Chicago Berkeley, Cal.

Don Smith Joins Milwaukee Hydraulic

Don Smith, formerly sales manager of General Excavator Co., Marion, O., has been appointed vice president and director of sales for the Milwaukee Hydraulic Corporation, Milwaukee, Wis.,



Don Smith

manufacturer of an all-hydraulic crane. Mr. Smith has been connected with the excavator industry for 20 years. In 1927 he became associated with the Harnischfeger Co. (P. & H. Co.), Milwaukee, Wis., in an advertising and later in a sales capacity. He left New York in 1937 to become sales manager of the General Excavator Co.

PCA Opens New District Office

The Portland Cement Association, Chicago, Ill., has opened a district office in the Boston Bldg., Denver, Colo., in charge of E. W. Thorson as district engineer. The Denver office will be

headquarters for the Association activities in Colorado and Wyoming, taking over the services previously rendered by the Western Portland Cement Association. Mr. Thorson has been with the Association since 1934 when he joined the staff as a fieldman in Iowa. He was structural engineer in the Iowa district from 1937 to 1941 when he was called to active duty in the Civil Engineer Corps, U. S. Navy. On his release from the Navy in 1945 he served as structural engineer for the Association in the Minneapolis District.

New Sales Representatives for Barco

New sales representatives for Barco gasoline hammers have been announced by F. N. Bard, owner Barco Manufacturing Co., Chicago, Ill. D. W. Jacquays, 132 W. Granada, Phoenix, Ariz., has been appointed distributor for the state of Arizona with the exception of Mohave and Yuma counties. This provides sales and service facilities at Phoenix and supplements the activities of the Francis Wagner Co. of El Paso, Tex., which extend into Arizona. The Brown Machinery Co. of Oklahoma City, with J. S. Brown, president, has

been appointed sales agent for Oklahoma. H. W. Fletcher, owner of Fletcher Equipment & Supplies, 609 Tchoupitoulas St., New Orleans, has been appointed agent in southern Louisiana and southern Mississippi. A. B. Pinson has been named sales representative in the South Atlantic states and W. S. Winters sales representative in the Northeastern Atlantic states.

Oil Companies Merge

Freedom-Valvoline Oil Co., Freedom, Pa., has announced the merger of the Freedom Oil Co., Galena Oil Corporation and Valvoline Oil Co. The officers are William G. Bechman, chairman board of directors; Gus P. Doll, vice-chairman, board of directors, executive vice president, and Earle M. Craig, president.

Move Offices

C. J. Leroux, vice president in charge of sales, and G. L. Service, manager of advertising and sales promotion, for the Freedom-Valvoline Oil Co., have moved their offices from 431 Main St., Cincinnati, O., to the general offices of the company at Freedom, Pa.

The Sign of Safety



—the Safer Guard Rail that Stands up Better



TUTHILL Highway Guard has that combination of features Highway Engineers like so well: A high degree of safety, easy installation and low upkeep expense. Made of strong steel, with panels cut to convenient length, this Guard is easy to install. Its strength to resist impact, and yet stand erect, means greater safety, besides a neater-looking, more permanent job. Proof? The hundreds of TUTHILL Guards along America's scenic highways. Available for maintenance or installation. Write for details.

Pacific Coast Manufacturers and Distributors:
U. S. SPRING & BUMPER CO., Los Angeles, Calif.

TUTHILL SPRING COMPANY
 761 W. POLK ST. CHICAGO 7 ILL.



Wheels

...that are RIGHT!



... FOR YOUR EVERY NEED

More than half a century of "know-how" back of EWC Wheel designing and manufacture is your guarantee of the right wheel always for your every specific need. We make all types, all sizes. Avail yourself of this experienced engineering guidance in wheels.

WRITE for BULLETIN
 Write today for illustrated Bulletin and complete details on EWC wheels for every purpose. No obligation.

ELECTRIC WHEEL CO.
 QUINCY, ILLINOIS
 Dept. RS

Wheel Wrights to Industry

Toncan Meets

Toncan Culvert Manufacturers Association held its first national meeting since 1941 at Hotel Cleveland, Cleveland, O., April 15-17. The association is composed of representatives of fabricating companies who use Toncan iron, a product of Republic Steel Corporation, in building culverts and other drainage products. The association was inactive during the war but has recently set up national headquarters at 1112 Standard Bldg., Cleveland. Harold J. Bair, president of the Empire State Culvert Corporation, Groton, N. Y., was elected president of the association for the coming year. O. H. Miller, president of Choctaw, Inc., Memphis, Tenn., was elected vice president and N. J. Thompson, sales manager of Thompson Pipe and Steel Co., Denver, Colo., secretary and treasurer.



H. J. Bair

Ransome Distributors

Contracts have been signed between

Ransome Machinery Co. and the following equipment companies for exclusive territorial distributorships of Ransome Blue Brute pavers and mixers: Wilhelm-Davies Co., Inc., Hamden, Conn.; Interstate Truck & Equip. Co., Billings, Mont.; Airport Machinery & Storage Co., Anchorage, Alaska; J. K. Wheeler Machinery Co., Salt Lake City, Utah; Burford-Toothaker Tractor Co., Montgomery, Ala.; Shaw Equipment Co., Dallas, Tex.; Dempster Bros., Inc., Knoxville, Tenn.; Carroll-Edwards & Co., Cincinnati, O.; Bud Fisher Co., Albuquerque, N. M.; Andrews Equipment Service, Portland, Ore., and Spokane, Wash.; Epperson & Co., Tampa, Fla.; Highway Equipment & Sup. Co., Orlando, Fla.; Jackson Road Equipment Co., Jackson, Miss.; The Finn Equipment Co., Cincinnati, O.; Caird Engineering Works, Helena, Mont.; Arrow Supply Co., Inc., Wilkesburg, Penn.; Drott Tractor Co., Inc., Milwaukee, Wis.

Explosives Institute Headquarters Changed

Major C. Stewart Comeaux, Sec.-Treas., has announced that headquarters of the Institute of Makers of Explosives has moved from 103 Park Avenue to 343 Lexington Avenue,

New York City. The Institute, which has 12 member companies and 3 associate members, manufacturers of commercial explosives, blasting caps and fuse, had been in the Park Avenue offices for 30 years.

Sabin Appointed Advertising Director

Jerry Sabin, advertising manager of the Colorado Division of CF&I, has been appointed director of advertising for the Colorado Fuel and Iron Corp., all divisions and subsidiaries, with headquarters in Denver, Colo. He was first employed by CF&I in June, 1926, as sales promotion worker in the field division. Later he became assistant manager of advertising and in 1931 was promoted to manager.

Hall Elected Vice President

A. P. Hall has been elected vice president of American Chain & Cable Co., Inc., Bridgeport, Conn. Before joining the company in 1944, he had been in the steel industry for 22 years and is well known in the metal and allied fields. He will continue his present duties as general manager of sales, and his headquarters will remain at 230 Park Ave., New York City.



MARINE PRODUCTS CO.

ENGINEERED EQUIPMENT

Industrial



Marine

6636 CHARLEVOIX AVE

DETROIT 7, MICHIGAN



Gorman-Rupp pumps represent years of specialized engineering study of contractor's pumping problems. They will pump as much, or more, water for more continuous hours without a stop and at less maintenance cost than any other pump on the market. A reliable pump for every purpose.

Your nearest Gorman-Rupp Distributor will be glad to put one of these pumps on your next job and let it talk for itself. Write for further details.



THE GORMAN-RUPP COMPANY

MANSFIELD • OHIO

Shunk ^{now} ~~new~~ and Ice Removal BLADES

Proved record of superior performance. Made of specially developed steel to withstand severe service conditions. FOR ALL TYPES AND MODELS OF SNOW PLOWES Various widths, lengths, thicknesses—flat or curved—standard or special—punched ready to fit your machine.

SHUNK SAW-TOOTH ICE BLADE Amazingly effective. Thoroughly breaks up and removes heavy, slippery ice and snow formations. Replaces all types of snow plow blades or maintenance units. Write for Bulletin and name of nearest Distributor.

Shunk
MANUFACTURING
COMPANY
BUCYRUS, OHIO.

All through the Night
wherever they need Light!



On the
Farm
Plain Globe

**EMBURY
AIR PILOT
LANTERN**

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Highway Traffic Within 1.6% of Prewar Volume

The volume of traffic on the nation's highways during April of this year was within 1.6 per cent of the traffic volume on rural highways in 1941, the peak year, according to reports received by the Public Roads Administration from state authorities.

Figures for April showed that the upsurge in highway travel was greatest in the Western states, where a 21 per cent increase over traffic volumes in the corresponding 1941 period was reported. Traffic volumes in the Mid-west states during April were 4.2 per cent below 1941 levels, and in the Eastern states 10 per cent below.

In comparison with figures for April, 1945, traffic in the Western states increased 63 per cent; in the Central states, 48 per cent, and in the Eastern states, 51 per cent.

21 Men Complete Traffic Engineering Studies at Yale

Twenty-one men have just completed a graduate course in Traffic Engineering at Yale University. The course required a full academic year of graduate study in such matters as the basic theory and practice of traffic regulation, design planning and administration, dealing with problems of safety and expeditious movement in highway transportation.

"The training of these men and their return to active positions in public service is especially timely in view of the rising toll of traffic accidents and the waste of community resources through congestion," stated Professor Kent T. Healy, Chairman of Yale's Committee on Transportation, in commenting on the work. All parts of the U. S., Canada and Hawaii were represented. Three came from China.

These men represent various branches of state highway departments and city agencies. They came from state highway traffic engineering departments as well as planning, design, maintenance and bridge divisions. The men from urban areas came from traffic engineering divisions, departments of public safety, and city planning commissions.

The graduates will go out to join 131 men already in the field who have completed similar courses at Yale. The great majority, once having specialized in traffic work, are challenged more than ever with the need for such work and continue in active service.

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"Traffic is no longer a problem which can be solved by the layman," reminded Mr. Healy. "The complexities of gaining safety and efficiency of movement in highway transportation requires special skills and demands professional training and experience."

The names and positions of the men completing the course are:

Robert A. Burch, traffic engineering department North Carolina state highway and public works commission, Raleigh; M. Earl Campbell, state highway planning division, West Virginia state road commission, Charleston; J. Anthony Carrothers, engineering division, City of Detroit; Philippe L. Ewart, Quebec department of highways, Montreal, Quebec; Adrien Genest, city planning division, Montreal; Stewart M. Gourlay, department of street railways, City of Detroit; Theodore L. Gustafson, design division, Connecticut state highway department, Hartford; J. Spencer Howerton, department of public safety, Richmond, Va.; George W. Howie, Jr., traffic engineering division, Portland, Ore.; David S. Johnson, planning division, Connecticut state highway department; W. Norman Kennedy, traffic division, Washington state department of highways, Olympia; Charles S. LeCraw, Eno Foundation for Highway Traffic Control, Saugatuck, Conn.; T. P. Liang, Gee Lin, and C. M. Liu, Chinese National Highway Administration, Nanking, China; Fred J. Manning, traffic division, Miami, Fla.; Robert G. Mitchell, design division, Connecticut state highway department; Earle W. Osterhoudt, traffic control division, Connecticut highway department; William R. Welty, traffic engineering division, Texas highway department, Austin; Melbourne H. West, traffic division, California division of highways, San Diego; F. Houston Wynn, city plan commission, Honolulu, Hawaii.

P.C.A. to Have Expanded Research Program

The Portland Cement Association, through its president, Frank T. Sheets, has announced plans for an immediate and marked expansion of its research and development activities in the field of portland cement, concrete and their engineering applications.

To assure adequate financing and continuity of this expanded program over the years, the Association's member companies have formally adopted by-law amendments setting aside a substantial part of the Association's yearly income to be used solely for research and development work.

As a means of improving administrative direction and intensifying the attack on research and development problems, all such activities will hereafter be handled through a newly created Division of Research and Development, to be administered by a vice president who will be responsible only to the president.

In filling this important post, the Association sought an outstanding scientist and chemical engineer with broad experience in industrial re-

search, and has just announced the election of Dr. A. Allan Bates as vice president for Research and Development, effective July 1.

Dr. Bates is widely known for his accomplishments in the fields of chemistry, chemical engineering, ceramics and metallurgy. Since 1938 he has been manager of the Chemical, Metallurgical and Ceramic Research Division of the Westinghouse Electric Corporation.

Over 10,000 overload violations were reported on Michigan highways in 1945, according to figures compiled by the state highway department. The department's Weighmaster Division inspected 648,868 trucks that year, having stepped up its inspection due to the critical condition of pavements resulting from excess loadings.

"Roadside Development and Highway War Memorials"—20-page pamphlet on the value of such memorials and suggestions for civic organizations in planning them. North Carolina state highway and public works commission, Raleigh, N. C.

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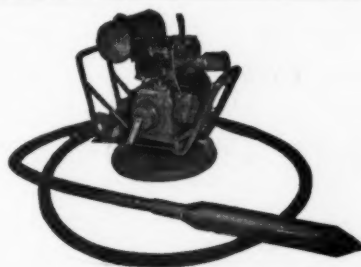
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Tire Wear and Cost

The factors which directly affect tire wear and cost have been determined from the results of 450,000 miles of carefully controlled driving on gravel and, bituminous surfaces and concrete pavements in the states of Iowa, Kansas, Missouri and Wyoming and are reported by Moyer and Tesdall in the 128 page Bulletin 161, "Tire Wear and Cost on Selected Roadway Surfaces," of the Engineering Experiment Station, Iowa State College, Ames, Ia.

This study of tire wear and cost is part of a general investigation of the effects of roadway surfaces on the costs of automobile operation, carried out from 1938 to 1942 in cooperation with the Public Roads Administration and requiring detailed observations with eight cars driven at speeds ranging from 25 to 65 mph.

The results show that tire wear is influenced directly by 15 factors, the most important being car speed, roadway surface, and driving and maintenance habits of the operator, and that 12 factors, most of which are avoidable, contribute directly to tire carcass failure. The average rate of tire wear observed on concrete pavements and bituminous surfaces indicates that, with due attention to tire maintenance, a life of 56,500 miles may be expected if speed does not exceed 35 mph., whereas at 65 mph. the life expectancy is only 18,700 miles. In the road trials the average life of ten tires operated on concrete pavements was 36,650 miles; that of twenty tires on gravel surfaces was 23,160 miles, many of these tires being retired because of carcass failures before the treads were worn smooth. Also, there were 98 punctures in 132,000 miles of travel on gravel surfaces, as compared to a single puncture in an equal distance on concrete pavements, and one punc-

ture in 72,000 miles on bituminous surfaces.

The records show: that tire wear on curves at speeds which cause the tires to "scream" is more than ten times the wear at speeds which do not result in sidewise skidding; that the tire costs in "stop-and-go" driving on concrete pavements are slightly more than three times the corresponding costs for average country driving; and that many thousands of car-miles or tire use are lost through avoidable carcass failures.

Single copies of this 128-page bulletin may be obtained without charge from the Engineering Experiment Station, Iowa State College, Ames, Ia.

Ohio Office to Be Linked by Teletype

The 12 divisions of the State Highway Department of Ohio, the four regions and the testing laboratory will be connected with the central office at Columbus, O., by teletype-writer equipment. This communication system was decided on several months ago after a test with teletype printers in the Central Office, Lima, Toledo, and the laboratory at Ohio State University proved such a system would enable the Highway Department to serve the people of Ohio better and faster. It is stated that it will cost \$3,266 to install the complete system, and \$30,456 annually to operate it. An additional expenditure of \$7,250 to build an addition to the Highway Patrol station at Columbus, needed to house new equipment, was approved last year by the Board of Control. Money saved by cutting long distance telephone tolls will pay a great share of the teletype cost.

Four CAA Officials Are Honored at Convention

Four Civil Aeronautics Administration officials received high honors at the annual convention of the American Association of Airport Executives held in Chicago. Hervey Law, Administrator of the Washington National Airport, was elected second vice president of the association, ensuing year. For outstanding contributions to aviation and airports during 1945, Charles B. Donaldson, CAA Assistant Administrator for Airports; S. E. Travis, Jr., Superintendent of Airports in the CAA Fourth Region; and George R. Borsari, CAA Airport Liaison Division, received honorary lifetime membership in the organization.

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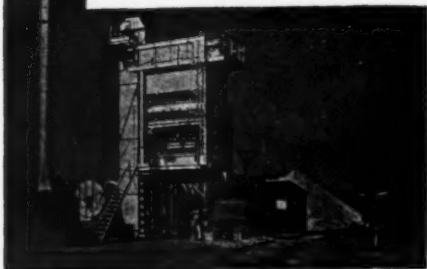
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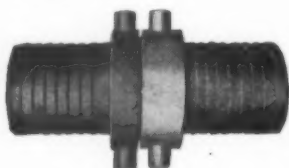
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INDEX TO ADVERTISERS

*Adams Mfg. Co., J. D.....Second Cover	*Laclede Steel Co.....123
*Aeroil Products Co.....131	*La Crosse Trailer & Equipment Co...129
*Ailis-Chalmers Tractor Division.....23	Lewis Mfg. Co., H. W.....129
American Bosch Corp.....41	Le Roi Co.....99
American Cable Division...Third Cover	Lima Loc. Wks.....56
Armco Drainage & Metal Products, Inc. ....119	*Link-Belt Speeder Corp.....58
*Ariens Co.....122	Lion Oil Co.....51
*Austin-Western Co.....31	*Littleford Bros. ....17
*Barber Greene Co.....27	Mack Trucks, Inc.....103
Barco Mfg. Co.....8	Marine Products Co.....127
Barnes Mfg. Co. ....116	Marion Power Shovel Co., The.....60
*Bethlehem Steel Co.....1	McCarter Iron Works, Inc.....131
*Blaw-Knox Co. ....25	*Michigan Power Shovel Co.....62
Briggs & Stratton Corp.....97	Municipal Supply Co.....131
Buckeye Traction Ditcher Co.....50	Murray Sales, Inc.....122
*Burch Corp. ....124	
Bucyrus-Erie Co. ....46	*Osgood Co. ....52
*Buffalo-Springfield Roller Co.....110	Ohio Oil Co.....47
	Owatonna Tool Co.....107
Calcium Chloride Assn.....117	*Owen Bucket Co., The.....125
Carver Pump Co.....98	
Caterpillar Tractor Co. ....6-7	Paxton Diesel Engr. Co.....128
C. I. T. Corp.....14	Perfection Steel Body Co.....111
*Ceco Steel Products Corp.....10	Portland Cement Ass'n.....36
Chrysler Corp. (Industrial Eng. Div.) 45	
*Cleaver-Brooks Co. ....44	Racine Steel Casting Co. (Belle City Div.).....43
Cleveland Rock Drill Div. (Cleveland Pneumatic Tool Co.).....24	Rapid Pavement Breaker Co.....48
	*Reilly Tar & Chem. Corp.....114
Davey Compressor Co.....2	Rogers Brothers Corporation.....125
Dewey and Almy Chemical Co.....100	
Detroit Diesel Eng. Div.....38	*Saurman Bros., Inc.....48
Dietz Co., R. E.....48	*Schramm, Inc. ....37
Dixon Valve & Coup. Co.....132	*Servicised Products Corp.....121
Dobbins Mfg. Co.....115	*Shunk Mfg. Co.....128
Dow Chemical Co., The.....63	Sinclair Refining Co.....20
	Standard Oil Calif.....16
*Electric Taper & Equip. Co.....113	Syntron Co. ....118
Electric Wheel Co.....126	
Embury Mfg. Co. ....128	*Texas Co., The.....Back Cover
*Erie Steel Constr. Co.....123	Thew Shovel Co., The.....3
	Timken Roller Bearing Co., Front Cover
Flink Co. ....120	Toncan Culvert Mfrs. Ass'n.....22
Foot Co., Inc., The.....33	Truscon Steel Co.....32
Ford Motor Trucks.....26	*Tuthill Spring Co.....126
*Four Wheel Drive Auto Co.....11	Truk-Loder Co.....2
*Galion Iron Works & Mfg. Co., The 21	Unit Crane & Shovel Corp.....55
Goodyear Tire & Rubber Co.....64	*Universal Engr. Corp.....42
Gorman-Rupp Co., The.....147	Universal Road Machinery Co.....131
General Motors Corp. (GMC Truck & Coach Div.).....28	Upson-Walton Co., The.....15
*General Excavator Co.....52	
*Gar Wood Industries, Inc.....9-39	
	Vickers, Inc. ....57
*Hanson Clutch & Machinery Co.... 29	Vulcan Tool Mfg. Co.....131
Hanson & Co., Howard.....48	
Hazard Wire Rope Division..Third Cover	Walter Motor Truck Co.....61
*Heil Co. ....30	War Assets Administration.....40-59
Hetherington & Berner, Inc.....112	Warren-Knight Co.....130
Huber Mfg. Co., The.....19	*Wellman Engineering Co., The.....54
	White Mfg. Co.....129
Independent Pneumatic Tool Co....12-13	Wickwire Spencer Wire Rope Co...111
*International Harvester Co.....4-5	Woodridge Mfg. Co.....18
	*Wisconsin Motor Corp.....124
Jackson Vibrators, Inc.....113	
*Jaeger Mach. Co., Inc.....35	*Advertisers with * are represented in the 1945 edition of Powers Road and Street Catalog and Data Book. Please refer to it for additional information on any of their products.
Johnson Co., C. S.....54	
Koppers Co., Inc.....34-53	
Koehring Co.49	
Kotal Co.128	

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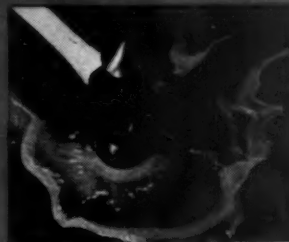
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